INTRODUCTION TO PHARMACOLOGICAL TERMINOLOGY, DRUG PRESCRIPTION AND PHARMACEUTICAL DRUG DOSAGE FORMS FOR ENGLISH SPEAKING STUDENTS

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1. Introduction to pharmacological terminology (L. Landa)

The terminology for drug prescription is based on the use of Latin (or much less frequently Greek) expressions. Thus, it is essential to be familiar with this vocabulary and also with the correct grammatical forms that are used in prescription according to the established rules.

The following overview is intended to summarize the most frequently used vocabulary necessary for prescription and it emphasizes the most important grammatical phenomena in selected word classes. As many settled expressions are also used, they are also mentioned along with their abbreviations in this part. Finally, the end of this overview brings information on pharmacopoeia and includes some pharmacopoeial names of selected substances (officinal names listed in the Czech Pharmacopoeia 2009).

1.1. Substantives

Substantives can be subdivided into five declensions. For the purposes of prescription, only the 1st case (nominative) and 2nd case (genitive) of singular and 1st case of plural are required.

1st declension (feminines) - example: aqua (f) = water

Singular
1. (nominative): aqua
2. (genitive): aquae

Plural
1. (nominative): aquae

Summary of terms belonging to the 1st declension frequently used in pharmacology:

althaea          althaea (rose of Sharon)
<table>
<thead>
<tr>
<th>Latin</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>ampulla</td>
<td>ampule (vial)</td>
</tr>
<tr>
<td>camphora</td>
<td>camphor</td>
</tr>
<tr>
<td>capsula</td>
<td>capsule</td>
</tr>
<tr>
<td>chamomilla</td>
<td>chamomile</td>
</tr>
<tr>
<td>charta</td>
<td>paper sack</td>
</tr>
<tr>
<td>formula</td>
<td>prescription</td>
</tr>
<tr>
<td>gelatina</td>
<td>gelatine</td>
</tr>
<tr>
<td>gutta</td>
<td>drop</td>
</tr>
<tr>
<td>herba</td>
<td>herb</td>
</tr>
<tr>
<td>lagena (lagoena)</td>
<td>bottle</td>
</tr>
<tr>
<td>lana</td>
<td>wool</td>
</tr>
<tr>
<td>litra</td>
<td>litre</td>
</tr>
<tr>
<td>massa</td>
<td>mass</td>
</tr>
<tr>
<td>mixtura</td>
<td>mixture</td>
</tr>
<tr>
<td>officina</td>
<td>pharmacy</td>
</tr>
<tr>
<td>olla</td>
<td>jar</td>
</tr>
<tr>
<td>pasta</td>
<td>paste</td>
</tr>
<tr>
<td>pilula</td>
<td>pill</td>
</tr>
<tr>
<td>salvia</td>
<td>sage</td>
</tr>
<tr>
<td>scatula</td>
<td>box</td>
</tr>
<tr>
<td>tabuletta</td>
<td>tablet</td>
</tr>
<tr>
<td>tela</td>
<td>gauze, mull</td>
</tr>
<tr>
<td>tinctura</td>
<td>tincture</td>
</tr>
</tbody>
</table>
2\textsuperscript{nd} declension (masculines, neutres) - example: numerus (m) = number

- example: acidum (n) = acid

**masculines**

**Singular**

1. (nominative): numerus

2. (genitive): numeri

**Plural**

1. (nominative): numeri

**neutres**

**Singular**

1. (nominative): acidum

2. (genitive): acidi

**Plural**

1. (nominative): acida

Summary of terms belonging to the 2\textsuperscript{nd} declension frequently used in pharmacology:

**masculines**

- bacillus (stillus) stick
- bolus bolus
- globu(lu)s globe, ball
- juniperus juniper
- laurus daphne
sirupus  syrump

neutres

amylum  starch
balneum  bath
balsamum  balsam
calcium  calcium
carvum  caraway
coffeinum  caffeine
deoctum  decoction
emplastrum  plaster
ethanolum  ethanol (spiritus)
extactum  extract
foeniculum  fennel
folium  leaf
gossypium  cotton-wool
granulum  grain, granule
guttatorium  dropper applicator
infusum  infusion
linimentum  liniment
linum  flix
liquidum  liquid
praeparatum  preparation
remedium drug, curative substance
suppositorium suppository
talcum talc
unguentum unguent, ointment
vaselinum jelly
vehiculum vehicle (pharmaceutical excipient)
venenum poison
vitrum vial (up to 100 ml)

3rd declension (masculines, feminines, neuters) - example: cremor (m) = cream

- example: infusio (f) = infusion

- example: gramma (n) = gram

Note: Substantives in this declension have genitive of singular with the ending –is, however, the nominative of singular may have various endings (e.g. -or, -is, -o, -es, -er, -men, -us, -ur, ma, -t, -o, -x, -s, -as, -c, -e, el).

masculines

Singular
1. (nominative): cremor
2. (genitive): cremoris

Plural
1. (nominative): cremores
feminines

Singular
1. (nominative): infusio
2. (genitive): infusionis

Plural
1. (nominative): infusiones

neutres

Singular
1. (nominative): grammata
2. (genitive): grammatis

Plural
1. (nominative): grammata

Summary of terms belonging to the 3rd declension frequently used in pharmacology:

masculines
adeps, adipis grease
carro, carbonis charcoal
cortex, corticis cortex
ether, etheris ether
flos, floris flower
liquor, liquoris liquid
pulvis, pulveris powder
sapo, saponis  

soap

sal, salis  

salt

vapor, vaporis  

vapour, steam

**feminines**

compositio, compositionis  

composition

dosis, dosis  

dose

emulsio, emulsionis  

emulsion

expeditio, expeditionis  

drug package

inhalatio, inhalationis  

inhalation

iniectionio, iniectionis  

injection

mucilago, mucilaginis  

mucus

pars, partis  

part

pix, picis  

tar

praescriptio, praescriptionis  

prescription

radix, radicis  

root

solutio, solutionis  

solution

suspensio, suspensionis  

suspension

unitas, unitatis  

unit

**neutres**

clysma, clysmatis  

infusion (rect.)

gramma, grammatis  

gram
lac, lactis                     milk
miligramma, miligrammatis     milligram
papaver, papaveris            poppy
semen, seminis                seed
sulfur, sulfuris              sulphur

4th declension (masculines, feminines) - example: usus (m) = need

**Singular**

1. (nominative):   usus
2. (genitive):      usus

**Plural**

1. (nominative):   usus

Summary of terms belonging to the 4th declension frequently used in pharmacology:

fructus (m)         fruit
manus (f)           hand
quercus (f)         oak
spiritus (m)        spirit (ethanol)

5th declension (masculines, feminines) - example: dies (m) = day

**Singular**

1. (nominative):   dies
2. (genitive):      diei
Plural

1. (nominative): dies

Summary of terms belonging to the 5th declension frequently used in pharmacology:

glacies, glaciei (f) ice

species, speciei (f) species

species, specierum (f plurale tantum) tea mixture, species

1.2. Adjectives

Adjectives with various nominative endings for masculines, feminines and neutres (1st and 2nd declension)

(all three genders)

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>masculines:</td>
<td>-us (-er)</td>
</tr>
<tr>
<td>feminines:</td>
<td>-a</td>
</tr>
<tr>
<td>neutres:</td>
<td>-um</td>
</tr>
</tbody>
</table>

Summary of terms belonging to this group frequently used in pharmacology:

acidus            acid

adhaesivus        adhesive

adspersorius      dusting

aegrotus          ill

albus             white
<table>
<thead>
<tr>
<th>Latin</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>alius</td>
<td>another, other</td>
</tr>
<tr>
<td>amarus</td>
<td>bitter</td>
</tr>
<tr>
<td>amplus</td>
<td>wide</td>
</tr>
<tr>
<td>amylaceus</td>
<td>amylaceous</td>
</tr>
<tr>
<td>aquosus</td>
<td>aqueous</td>
</tr>
<tr>
<td>causticus</td>
<td>caustic</td>
</tr>
<tr>
<td>compositus</td>
<td>composed</td>
</tr>
<tr>
<td>concentratus</td>
<td>concentrated</td>
</tr>
<tr>
<td>crudus</td>
<td>raw</td>
</tr>
<tr>
<td>dilutus</td>
<td>diluted</td>
</tr>
<tr>
<td>divisus</td>
<td>divided</td>
</tr>
<tr>
<td>durus</td>
<td>hard</td>
</tr>
<tr>
<td>flavus</td>
<td>yellow</td>
</tr>
<tr>
<td>fluidus</td>
<td>liquid</td>
</tr>
<tr>
<td>fuscus</td>
<td>dark</td>
</tr>
<tr>
<td>gelatinosus</td>
<td>gelatinous</td>
</tr>
<tr>
<td>guttatus</td>
<td>dropping</td>
</tr>
<tr>
<td>intravenosus</td>
<td>intravenous</td>
</tr>
<tr>
<td>maximus</td>
<td>maximal</td>
</tr>
<tr>
<td>minimus</td>
<td>minimal</td>
</tr>
<tr>
<td>obductus</td>
<td>covered, coated</td>
</tr>
<tr>
<td>oleosus</td>
<td>oily</td>
</tr>
<tr>
<td>ophthalmicus</td>
<td>ophthalmological</td>
</tr>
</tbody>
</table>
peruvianus  peruvian  
proprius  proper  
pulveratus  pulverized  
purificatus  purified  
purus  pure  
ruber  red  
siccus  dry  
singulus  simple  
spissus  dense, thick  
subcutaneus  subcutaneous  
suillus  pork (sus = pig)  
therapeuticus  therapeutic  
toxicus  toxic  
varius  various  
veterinarius  veterinary  
vitreus  vitreous, glass  

*Adjectives with one nominative ending for masculines and feminines and another for neuters (3rd declension)*

(masculines + feminines x neutres)

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>masculines: -is</td>
<td>-es</td>
</tr>
<tr>
<td>feminines: -is</td>
<td>-es</td>
</tr>
</tbody>
</table>
neutres: -e -ia

Summary of terms belonging to this group frequently used in pharmacology:

dulcis sweet
enteralis intestinal
fortis strong
intradermalis intradermal
intramuscularis intramuscular
letalis lethal
mollis soft
nasalis nasal
officinalis officinal
oralis oral
originalis original
parenteralis parenteral
rectalis rectal
tenuis thin, tenuous
vaginalis vaginal

Adjectives with one nominative ending for masculines, feminines and neutres (3\textsuperscript{rd} declension)

(masculines + feminines + neutres)

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>dulcis</td>
<td>sweet</td>
</tr>
<tr>
<td>enteralis</td>
<td>intestinal</td>
</tr>
<tr>
<td>fortis</td>
<td>strong</td>
</tr>
<tr>
<td>intradermalis</td>
<td>intradermal</td>
</tr>
<tr>
<td>intramuscularis</td>
<td>intramuscular</td>
</tr>
<tr>
<td>letalis</td>
<td>lethal</td>
</tr>
<tr>
<td>mollis</td>
<td>soft</td>
</tr>
<tr>
<td>nasalis</td>
<td>nasal</td>
</tr>
<tr>
<td>officinalis</td>
<td>officinal</td>
</tr>
<tr>
<td>oralis</td>
<td>oral</td>
</tr>
<tr>
<td>originalis</td>
<td>original</td>
</tr>
<tr>
<td>parenteralis</td>
<td>parenteral</td>
</tr>
<tr>
<td>rectalis</td>
<td>rectal</td>
</tr>
<tr>
<td>tenuis</td>
<td>thin, tenuous</td>
</tr>
<tr>
<td>vaginalis</td>
<td>vaginal</td>
</tr>
</tbody>
</table>
masculines: -x, -ns -es
feminines: -x, -ns -es
neutres: -x, -ns -ia

Summary of terms belonging to this group frequently used in pharmacology:
adiuvans, adiuvantis (gen.) additional, complementary
constituens, constituentis (gen.) constituting, generating
corrigens, corrigentis (gen.) corrective
duplex, duplicis (gen.) double
emoliens, emolientis (gen.) emollient
enterosolvens, enterosolventis (gen.) enterosolvent
laxans, laxantis (gen.) laxative
simplex, simplicis (gen.) simple
solvens, solventis (gen.) soluble

Examples of inflexion in substantives and adjectives of various declensions:
Roman numerals indicate declension, Arab numerals indicate cases, m = masculine, f = feminine, n = neutre

vitreous stick
II.m II.m
1. bacillus vitreus 1. bacilli vitrei
2. bacilli vitrei

coated tablet
I.f I.f
1. tabuletta obducta 1. tabulettae obductae
2. tabulettae obductae

international unit

III.f  III.f
1. unitas internationalis 1. unitates internationales
2. unitatis internationalis

boric acid

II.n  II.n
1. acidum boricum 1. acida borica
2. acidi borici

pure ethanol

IV.m  II.m
1. spiritus purus 1. spiritus puri
2. spiritus puri

rectal suppository

II.n  III.n
1. suppositorium rectale 1. suppositoria rectalia
2. suppositorii rectalis

dry extract

II.n  II.n
1. extractum siccum 1. extracta sicca
2. extracti sicci

dense emulsion

III.f  I.f
1. emulsio spissa 1. emulsiones spissae
2. emulsionis spissae
dark bottle

1. lagoena fusca  
2. lagoenae fuscae

eye ointment

1. unguentum ophthalmicum  
2. unguentum ophthalmicum

intramuscular injection

1. inieccio intramuscularis  
2. iniectionis intramuscularis

concentrated solution

1. solutio concentrata  
2. solutionis concentratae

dropper container

1. vitrum guttatum  
2. vitri guttati

dusting powder

1. pulvis adspersorius  
2. pulveris adspersorii
dry root

III. f  I. f
1. radix sicca 1. radices siccae
2. radicis siccae

1.3. Numerals

Cardinal numerals have the greatest impact in prescription, because they are used to express the doses of substances and furthermore, number of units or number of drug packages in prescription. Please note, that the doses are written in Arabic numerals whereas the quantity (units, packages) is expressed in Roman numerals.

The first three cardinal numbers (1, 2, 3) are declinable as well as hundreds from 200 to 900. It is therefore essential to be familiar with the endings of their Latin forms in selected cases.

1  I

<table>
<thead>
<tr>
<th></th>
<th>masculine</th>
<th>feminine</th>
<th>neuter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>unus</td>
<td>una</td>
<td>unum</td>
</tr>
<tr>
<td>4th</td>
<td>unum</td>
<td><strong>unam</strong></td>
<td>unum</td>
</tr>
</tbody>
</table>

2  II

<table>
<thead>
<tr>
<th></th>
<th>masculine</th>
<th>feminine</th>
<th>neuter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>duo</td>
<td>duae</td>
<td>duo</td>
</tr>
<tr>
<td>4th</td>
<td>duos</td>
<td><strong>duas</strong></td>
<td>duo</td>
</tr>
</tbody>
</table>

3  III

|      | masculine | feminine | neuter |


<table>
<thead>
<tr>
<th></th>
<th>1st case</th>
<th>4th case</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>tres</td>
<td>tres</td>
</tr>
<tr>
<td>4</td>
<td>quattuor</td>
<td>tres</td>
</tr>
<tr>
<td>5</td>
<td>quinque</td>
<td>tria</td>
</tr>
<tr>
<td>6</td>
<td>sex</td>
<td></td>
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<tr>
<td>7</td>
<td>septem</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>octo</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>novem</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>decem</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>undecim</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>duodécim</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>tredecim</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>quattuordecim</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>quindecim</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>sedecim</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>septendecim</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>duodécim</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>undécim</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>viginti</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>unus et viginti (viginti unus)</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>duo et viginti (viginti duo)</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>duodécim</td>
<td></td>
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<td>---</td>
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</tr>
<tr>
<td>29</td>
<td>XXIX</td>
<td>undetriginta</td>
</tr>
<tr>
<td>30</td>
<td>XXX</td>
<td>triginta</td>
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<tr>
<td>40</td>
<td>XL</td>
<td>quadraginta</td>
</tr>
<tr>
<td>50</td>
<td>L</td>
<td>quinquaginta</td>
</tr>
<tr>
<td>60</td>
<td>LX</td>
<td>sexaginta</td>
</tr>
<tr>
<td>70</td>
<td>LXX</td>
<td>septuaginta</td>
</tr>
<tr>
<td>80</td>
<td>LXXX</td>
<td>octoginta</td>
</tr>
<tr>
<td>90</td>
<td>XC</td>
<td>nonaginta</td>
</tr>
<tr>
<td>100</td>
<td>C</td>
<td>centum</td>
</tr>
<tr>
<td>200</td>
<td>CC</td>
<td>ducenti, ducentae, ducenta</td>
</tr>
<tr>
<td>300</td>
<td>CCC</td>
<td>trecenti, -ae, -a</td>
</tr>
<tr>
<td>400</td>
<td>CD</td>
<td>quadringenti, -ae, -a</td>
</tr>
<tr>
<td>500</td>
<td>D</td>
<td>quingenti, -ae, -a</td>
</tr>
<tr>
<td>600</td>
<td>DC</td>
<td>sescenti, -ae, -a</td>
</tr>
<tr>
<td>700</td>
<td>DCC</td>
<td>septingenti, -ae, -a</td>
</tr>
<tr>
<td>800</td>
<td>DCCC</td>
<td>octingenti, -ae, -a</td>
</tr>
<tr>
<td>900</td>
<td>CM</td>
<td>nongenti, -ae, -a</td>
</tr>
<tr>
<td>1000</td>
<td>M</td>
<td>mille</td>
</tr>
<tr>
<td>2000</td>
<td>MM</td>
<td>duo milia</td>
</tr>
<tr>
<td>3000</td>
<td>MMM</td>
<td>tria milia</td>
</tr>
</tbody>
</table>
Multiples of numbers

once semel
bis twice
ter three times
quater four times
quinquies five times
sexies six times
septies seven times
octies eight times
nonies nine times
decies ten times

Tenths, hundredths and thousandths of grams are expressed by the appropriate prefix used in international system of units (SI):

1000 g = grammata mille
100 g = grammata centum
10 g = grammata decem
1 g = gramma unum
0.1 g = decigramma unum (miligrammata centum)
0.01 g = centigramma unum (miligrammata decem)
0.001 g = miligramma unum
2 g = grammata duo
0.2 g = decigrammata duo (miligrammata ducenta)
0.02 g = centigramata duo (miligrammata viginti)

0.003 g = miligrammata tria

4 g = grammata quattuor

1.4. Verbs

There is only very limited number of settled forms of verbs, that include mainly imperative, present active subjunctive and present passive subjunctive.

Imperative

Adde! add!

Cave! beware, avoid!

Da! give!

Divide! divide!

Expedi! deliver!

Filtra! filter!

Misce! mix!

Obduce! coat!

Para! prepare!

Recipe! take!

Signa! mark!

Solve! solve!
Sterilisa! sterilize!

**Present active subjunctive**

Fiat It is being made

Fiant They are being made

**Present passive subjunctive**

Detur It is being given

Dentur They are being given

Repetatur It is being repeated

Signetur It is being marked

Signentur They are being marked

Sterilisetur It is being sterilized

**1.5. Adverbs**

cito quickly

guttatim by drops

statim immediately
1.6. Prepositions

With accusative:

ad to, into
ante before
intra inside, in
per through, during, by
secundum according to, after

With ablative:

cum with
e, ex from, out of
pro for
sine without

With accusative and ablative:

in in, on (what), inside of, for (what)
sub under
### 1.7. Settled prescriptive expressions and acceptable abbreviations

<table>
<thead>
<tr>
<th>Latin expression</th>
<th>Acceptable abbreviation</th>
<th>English translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad usum veterinarium</td>
<td>Ad us. vet.</td>
<td>For veterinary use</td>
</tr>
<tr>
<td>Ad usum internum</td>
<td>Ad us. int.</td>
<td>For internal use</td>
</tr>
<tr>
<td>Ad usum externum</td>
<td>Ad us. ext.</td>
<td>For external use</td>
</tr>
<tr>
<td>Ad usum alium</td>
<td>Ad us. al.</td>
<td>For other use</td>
</tr>
<tr>
<td>Ad manus medici veterinarii</td>
<td>Ad man. med. vet.</td>
<td>To veterinarian’s hands</td>
</tr>
<tr>
<td>Adde bacillum vitreum</td>
<td>Adde bac. vitr.</td>
<td>Add vitreous stick</td>
</tr>
<tr>
<td>Adde guttatorium</td>
<td>Adde gutt.</td>
<td>Add dropper applicator</td>
</tr>
<tr>
<td>Pro medico veterinario</td>
<td>Pro med. vet.</td>
<td>For a veterinarian</td>
</tr>
<tr>
<td>Pro ordinatione</td>
<td>Pro ord.</td>
<td>For use at the doctor’s</td>
</tr>
<tr>
<td>Pro praxis mea</td>
<td></td>
<td>For my practice</td>
</tr>
<tr>
<td>Ad capsulas gelatinosas</td>
<td>Ad caps. gelat.</td>
<td>Into gelatine capsules</td>
</tr>
<tr>
<td>Ad chartam (chartas)</td>
<td>Ad chart.</td>
<td>Into paper sack</td>
</tr>
<tr>
<td>Ad vitrum guttatum</td>
<td>Ad vitr. gutt.</td>
<td>Into a dropper container</td>
</tr>
<tr>
<td>Ad lag(o)enam amplam</td>
<td>Ad lag. ampl.</td>
<td>Into a wide-mouthed bottle</td>
</tr>
<tr>
<td>Ad lag(o)enam fuscam</td>
<td>Ad lag. fusc.</td>
<td>Into a dark bottle</td>
</tr>
<tr>
<td>Ad lag(o)enam pro infusione</td>
<td>Ad lag. pro infus.</td>
<td>Into a bottle for infusion</td>
</tr>
<tr>
<td>Misce fiat</td>
<td>M. f.</td>
<td>Mix and make</td>
</tr>
<tr>
<td>Latin Expression</td>
<td>English Translation</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td>Sub signo veneni</td>
<td>Sub sign. ven. (S.s.ven.)</td>
<td>Marked as poison</td>
</tr>
<tr>
<td>Sine conservante</td>
<td>Sine conserv.</td>
<td>Without conservation additive</td>
</tr>
<tr>
<td>Sine antimicrobico</td>
<td>Sine antimicr.</td>
<td>Without antimicrobial additive</td>
</tr>
<tr>
<td>Suo nomine</td>
<td>S. n. (Suo nom.)</td>
<td>With its name (i.e. of the drug)</td>
</tr>
<tr>
<td>Cum formula</td>
<td>C. f. (C. form.)</td>
<td>With a copy of the prescription (the whole formula)</td>
</tr>
<tr>
<td>Ana (partes aequales)</td>
<td>aa</td>
<td>In equal portions</td>
</tr>
<tr>
<td>Quantum satis</td>
<td>q.s.</td>
<td>As many as necessary</td>
</tr>
<tr>
<td>Unitas internationalis</td>
<td>u.i., U.I.</td>
<td>International unit</td>
</tr>
<tr>
<td>Expeditio originalis</td>
<td>Exp. orig.</td>
<td>Original package</td>
</tr>
<tr>
<td>Tabuletta obducta</td>
<td>Tabul. (tabl.) obduct.</td>
<td>Coated tablet</td>
</tr>
<tr>
<td>Massa tabulettarum</td>
<td>Mass. tabul.</td>
<td>Tablet mass</td>
</tr>
<tr>
<td>Massa pro suppositoriis</td>
<td>Mass. pro supp.</td>
<td>Suppository base, supp. mass</td>
</tr>
<tr>
<td>Unguentum ophthalmicum</td>
<td>Ung. ophth.</td>
<td>Eye ointment</td>
</tr>
<tr>
<td>Dentur tales doses</td>
<td>D. t. d. (D. tal. dos.)</td>
<td>Give such doses</td>
</tr>
<tr>
<td>Divide in doses (aequales)</td>
<td>Div. in dos.</td>
<td>Divide into (equal) doses</td>
</tr>
<tr>
<td>Detur et signetur</td>
<td>D.S.</td>
<td>It is being given and it is being marked</td>
</tr>
<tr>
<td>Periculum in mora</td>
<td>-</td>
<td>Danger in delay</td>
</tr>
</tbody>
</table>
1.8. Pharmacopoeia

Pharmacopoeia is a pharmaceutical publication of a normative nature with nationwide validity and obligation for all, who deal with preparation, processing, manufacturing, control, distribution, storage and dispensing of medical products. It summarizes information on medicinal substances, healing preparations and pharmaceutical excipients. Pharmacopoeia is issued in the majority of world states. It should contribute to ensure safety, efficacy and quality of medical products. Name of this publication is derived from the Greek bases φαρμακο- (pharmako-) “drug” and ποι- (poi-) “make, prepare”.

Substances listed in pharmacopoeia are called “officinal”, other drugs not mentioned in the valid pharmacopoeia because their use is less frequent are called “non-officinal”. Drugs out of use that were withdrawn from the valid pharmacopoeia are termed “obsolete” substances. Nevertheless, even obsolete substances can be prescribed if there is a valid reason.

History of pharmacopoeia is quite long. The first works resembling modern pharmacopoeia occurred in ancient world (e.g. Edwin Smith Papyrus in Egypt and De Materia Medica originally written in Greek by Pedanius Dioscorides). The first work published under civic authority appeared probably in Nuremberg (1542) and was created by Valerius Cordus.

In the recent history, World Health Organisation (WHO) issued an international work called Pharmacopoeia Internationalis (Ph. Int.) in order to unify the pharmacopoeial rules and standards from different countries. Ph. Int. was published for the first time in 1951. In Europe, the first edition of European Pharmacopoeia (Ph. Eur.) was published in 1969. The Czech Republic participates in preparation of Ph. Eur. since 1998. At the time of writing, European Pharmacopoeia 7th edition (2011) plus 8 supplements are in force. Other important pharmacopoeias include e.g. British Pharmacopoeia (BP), Japanese Pharmacopoeia or United States Pharmacopeia (USP). Czech Pharmacopoeia - Pharmacopoea Bohemica 2009 (Ph. B. MMIX) consisting of three volumes and three supplements (2010, 2011, 2012) is currently valid in the Czech Republic.
Substantial part of this pharmacopeia represents an exact translation of the Ph. Eur. Ed. 6th and its 1st and the 2nd Supplements. The second part of the third volume is so called National part which takes into account national pharmacopoeial specificities. Similarly to the European Pharmacopoeia, the Czech Pharmacopeia is available in printed version and as a PC software.

The content of the Czech Pharmacopeia (both European and National parts) can be divided into general part and special part. General part includes (among others): introduction and characteristics of the pharmacopeia, list of authors, definitions, symbols, units, instructions on manipulation with medical products (storage, marking, etc.), description of laboratory and technological methods used on the field of handling with medical products, list of used laboratory reagents, description of individual drug dosage forms and types of medical products.

Special part includes so called monographs, which are sections concerning individual medical and auxiliary substances. Monographs are listed in alphabetical order according to the Latin pharmacopoeial names of the substances. Each monograph contains: Latin pharmacopoeial name, Czech pharmacopoeial name (eventually further synonyms), chemical characteristics of the substance, names and formulas including CAS (Chemical Abstracts Service) registry number, characteristics of the substance (description, solubility in various reagents, etc.), description of methods for identification tests, instructions for storage and labelling, some other instructions (warnings, reference substances, etc.).

The National part of the Czech Pharmacopoeia contents: General part, Reagents used in national monographs, Reference substance used in national monographs, Tables, Active substances and excipients, Medicinal products.

Overview of Tables:

1. Table I: Narcotics (§§) and psychotropic (§) substances
2. Table II: Venena (††) (very effective drugs)
3. Table III: Separanda (†) (effective drugs)
4. Table IV: Recommended therapeutic doses for adults
5. Table V: Recommended therapeutic doses for children
6. Table VI: Recommended doses of some substances used in animals
7. Table VII: Dependence relative density on ethanol content
8. Table VIII: Isotonisation water solutions of actives substances prepared in pharmacy
1.9. Pharmacopoeial names of selected substances

<table>
<thead>
<tr>
<th>Latin Name</th>
<th>English Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absinthii herba</td>
<td>Wormwood</td>
</tr>
<tr>
<td>Acidum acetylsalicycicum</td>
<td>Acetylsalicylic acid</td>
</tr>
<tr>
<td>Acidum boricum</td>
<td>Boric acid</td>
</tr>
<tr>
<td>Acidum hydrochloricum 10%</td>
<td>Hydrochloric acid, dilute</td>
</tr>
<tr>
<td>Acidum salicylicum</td>
<td>Salicylic acid</td>
</tr>
<tr>
<td>Acidum tartaricum</td>
<td>Tartaric acid</td>
</tr>
<tr>
<td>Adeps suillus</td>
<td>Pork fat</td>
</tr>
<tr>
<td>Alcohol cetylicus</td>
<td>Cetyl alcohol</td>
</tr>
<tr>
<td>Althaeae radix</td>
<td>Marshmallow root</td>
</tr>
<tr>
<td>Aminophenazonum</td>
<td>Aminophenazone (or Aminopyrine)</td>
</tr>
<tr>
<td>Aminophyllinum</td>
<td>Theophylline-ethylendiamine hydrate</td>
</tr>
<tr>
<td>Ammonii bromidum</td>
<td>Ammonium bromide</td>
</tr>
<tr>
<td>Ammonii chloridum</td>
<td>Ammonium chloride</td>
</tr>
<tr>
<td>Anisi etheroleum</td>
<td>Anise oil</td>
</tr>
<tr>
<td>Latin Name</td>
<td>English Name</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Anisi fructus</td>
<td>Aniseed</td>
</tr>
<tr>
<td>Aqua pro iniectione</td>
<td>Water for injections</td>
</tr>
<tr>
<td>Aqua purificata</td>
<td>Water, purified</td>
</tr>
<tr>
<td>Argenti nitras</td>
<td>Silver nitrate</td>
</tr>
<tr>
<td>Atropini sulfas</td>
<td>Atropine sulphate</td>
</tr>
<tr>
<td>Balsamum peruvianum</td>
<td>Peru balsam</td>
</tr>
<tr>
<td>Belladonae folii extractum sicum normatum</td>
<td>Belladona leaf dry extract, standardised</td>
</tr>
<tr>
<td>Bentonitum</td>
<td>Bentonite</td>
</tr>
<tr>
<td>Benzocainum</td>
<td>Benzocaine</td>
</tr>
<tr>
<td>Bismuthi subgallas</td>
<td>Bismuth subgallate</td>
</tr>
<tr>
<td>Cacao oleum</td>
<td>Cocoa oil</td>
</tr>
<tr>
<td>Calcii carbonas</td>
<td>Calcium carbonate</td>
</tr>
<tr>
<td>Calcii hydroxidi solution</td>
<td>Calcium hydroxide solution</td>
</tr>
<tr>
<td>Camphora racemica</td>
<td>Camphor, racemic</td>
</tr>
<tr>
<td>Carbo activatus</td>
<td>Charcoal, activated</td>
</tr>
<tr>
<td>Carvi fructus</td>
<td>Caraway fruit</td>
</tr>
<tr>
<td>Cera alba</td>
<td>Beeswax, white</td>
</tr>
<tr>
<td>Chamomillae romanae flos</td>
<td>Chamomile flower, roman</td>
</tr>
</tbody>
</table>
Chlorali hydras

Chloral hydrate

Chlorhexidini digluconatis solutio

Chlorhexidine digluconate solution

Citri etheroleum

Lemon oil

Cocaini hydrochloridum

Cocaine hydrochloride

Codeini phosphas hemihydricus

Codeine phosphate hemihydrate

Coffeinum

Caffeine

Diazepamum

Diazepam

Ephedrini hydrochloridum

Ephedrine hydrochloride

Epinephrini tartras

Adrenaline tartrate

Ergotamini tartras

Ergotamine tartrate

Ethacridini lactas monohydricus

Ethacridine lactate monohydrate

Ethanolum 60%, 85%, 96%

Ethanol 60%, 85%, 96%

Eucalypti etheroleum

Eucalyptus oil

Foeniculi dulcis fructus

Fennel, sweet

Formaldehydi solutio 35%

Formaldehyde solution 35%

Gallarum tinctura

Oak apple tincture

Glucosum

Glucose

Glycerolum 85%

Glycerol 85%

Helianthi oleum

Sunflower oil
<table>
<thead>
<tr>
<th>Latin Name</th>
<th>English Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homatropini hydrobromidum</td>
<td>Homatropine hydrobromide</td>
</tr>
<tr>
<td>Hydrogenii peroxidum 3%</td>
<td>Hydrogen peroxide solution 3%</td>
</tr>
<tr>
<td>Hyperici herba</td>
<td>St. John’s wort</td>
</tr>
<tr>
<td>Ichthammolum</td>
<td>Ichthammol</td>
</tr>
<tr>
<td>Iodi solutio ethanolica</td>
<td>Ethanolic solution of iodine</td>
</tr>
<tr>
<td>Jecori aselli oleum</td>
<td>Cod-liver oil</td>
</tr>
<tr>
<td>Juniperi fructus</td>
<td>Juniper</td>
</tr>
<tr>
<td>Kalii bromidum</td>
<td>Potassium bromide</td>
</tr>
<tr>
<td>Kalii iodidum</td>
<td>Potassium iodide</td>
</tr>
<tr>
<td>Kalii permanganas</td>
<td>Potassium permanganate</td>
</tr>
<tr>
<td>Lactosum</td>
<td>Lactose</td>
</tr>
<tr>
<td>Lavandulae etheroleum</td>
<td>Lavender oil</td>
</tr>
<tr>
<td>Lini semen</td>
<td>Linseed</td>
</tr>
<tr>
<td>Magnesii oxidum leve</td>
<td>Magnesium oxide, light</td>
</tr>
<tr>
<td>Magnesii sulfas heptahydricus</td>
<td>Magnesium sulphate heptahydrate</td>
</tr>
<tr>
<td>Matricariae flos</td>
<td>Matricaria flower</td>
</tr>
<tr>
<td>Melissae folium</td>
<td>Melissa leaf</td>
</tr>
<tr>
<td>Menthae piperitae etheroleum</td>
<td>Peppermint oil</td>
</tr>
<tr>
<td>Menthae piperitae folium</td>
<td>Peppermint leaf</td>
</tr>
</tbody>
</table>
Menthae piperitae herba  Peppermint tops
Mentholum racemicum  Menthol, racemic
Methylcellulosum  Methylcellulose
Methylrosanilinii chloridum  Methylrosanilinium chloride
Methylthioninii chloridum hydricum  Methylthioninium chloride
Millefolii herba  Yarrow
Morphini hydrochloridum trihydricum  Morphine hydrochloride
Myrrhae tincture  Myrrh tincture
Natrii benzoas  Sodium benzoate
Natrii bromidum  Sodium bromide
Natrii chloridum  Sodium chloride
Natrii hydrogenocarbonas  Sodium hydrogen carbonate
Natrii iodidum  Sodium iodide
Natrii perboras hydricus  Sodium perborate, hydrated
Natrii salicylas  Sodium salicylate
Natrii sulfas anhydricus  Sodium sulphate, anhydrous
Natrii tetraboras decahydricus  Borax
Papaverini hydrochloridum  Papaverine hydrochloride
Paracetamolum  Paracetamol
Paraffinum liquidum  Paraffin, liquid
Phenobarbitalum natricum  Phenobarbital sodium
Phenolum  Phenol
Physostigmini saliclas  Physostigmine salicylate
Pilocarpini hydrochloridum  Pilocarpine hydrochloride
Pix lithanthracis  Coal-Tar
Plantaginis folium  Ribwort plantain
Procaini hydrochloridum  Procaine hydrochloride
Propyphenazonum  Propyphenazone
Quinidini sulfas dihydricus  Quinidine sulphate
Ratanhiae tinctura  Rhatany tincture
Ricini oleum virginale  Castor oil, virgin
Saccharosum  Sucrose
Silica colloidalis anhydrica  Silica colloidal anhydrous
Sirupus simplex  Simple syrup
Sulfathiazolum  Sulfathiazole
Talcum  Talc
Tanninum  Tannic acid
<table>
<thead>
<tr>
<th>Latin Ingredient</th>
<th>English Ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetracaini hydrochloridum</td>
<td>Tetracaine hydrochloride</td>
</tr>
<tr>
<td>Thymi herba</td>
<td>Thyme</td>
</tr>
<tr>
<td>Tinctura amara</td>
<td>Bitter tincture</td>
</tr>
<tr>
<td>Trimecaini hydrochloridum</td>
<td>Trimecaine hydrochloride</td>
</tr>
<tr>
<td>Tritici amylum</td>
<td>Wheat starch</td>
</tr>
<tr>
<td>Valerianae radix</td>
<td>Valerian root</td>
</tr>
<tr>
<td>Valerianae tincture</td>
<td>Valerian tincture</td>
</tr>
<tr>
<td>Vaselinum album</td>
<td>Paraffin, white soft</td>
</tr>
<tr>
<td>Vaselinum flavum</td>
<td>Paraffin, yellow soft</td>
</tr>
<tr>
<td>Zinci oxidum</td>
<td>Zinc oxide</td>
</tr>
<tr>
<td>Zinci sulfas heptahydricus</td>
<td>Zinc sulphate</td>
</tr>
</tbody>
</table>
2. Rules for drug prescription (L. Landa, D. Vršková)

2.1. Introduction

Prescription form is an official document which must be written according to some settled rules and writing of prescription is governed by legislation nowadays. Using prescription doctor asks pharmacist to prepare and issue medical product. This is a classical definition for individually prepared medical preparations. Drug prescription originates in tradition that dates back to medieval times, nevertheless some similarities can be found even in the ancient Egypt and Rome.

Prescription in the Czech Republic is written according to tradition in Latin, except for a part called Signatura (see below) which gives information on how the medicine should be used (this part is written Czech or in a language understandable for the patient’s owner).

Maximally two kinds of different preparations may be prescribed on a single prescription form. If two medical products are prescribed, they must be separated by a double cross (♯). If one medical product is prescribed and there is some blank space left on the form, this space must be crossed in order to prevent misuse.

Figure 1: Example of prescription with 2 preparations:
Prescription is written on forms of paper size A6. It must be written legible, in an ineffaceable way (i.e. using a pen, typewriter or computer rather than a pencil). No strikes are allowed in prescriptions. If a mistake is made the form must be discarded or it can be corrected by a single crossing of the erroneous statement, doctor must write near this crossing the correct version plus abbreviation “corr.” (correxit, which means corrected) on the nearest margin and finally this correction must signed by the doctor.

**Figure 2: Example of prescription with correction:**

![Example of prescription with correction](image)

Although veterinarians can prescribe also human preparations, all preparations prescribed by a veterinary doctor are strictly intended for use in animals.

Exceptionally, in patient’s life threatening situations, prescription can be written without using pre-printed prescription form on a blank white paper. In such cases (danger in delay) also other formalities can be avoided. This prescription must than contain markedly written Latin adverb *cito* (quickly) or *statim* (immediately), placed on the top margin of the prescription form. The form must contain signature and registration number of the appropriate veterinary doctor.

Prescription of narcotics (§§) and psychotropic ($) substances has some characteristic features. These drugs must be prescribed on prescription forms with an oblique blue strip
(from the left bottom corner to the right upper corner). Prescription is made on one original form plus two copies. We can prescribe only one such medical product on the form with the blue oblique strip. No corrections are allowed in these prescriptions. Finally, in individually prepared preparations we have to express the amount of these substances also in words in parenthesis.

Example:

Morphini hydrochloridi trihydrici 0.03 (miligrammata triginta)

**Figure 3: Example of RMP prescription with the blue strip:**

There are certain differences in the time of validity in various prescription types:

1) common prescription - 14 calendar days (including the day of the prescription issue)

2) time of prescription validity can be prolonged by expression for repeated use - *Repetatur* (It is being repeated) and the appropriate multiple of number (which means, accordingly to the Act No. 246/2008, the total number of issues to be processed. Repeated use of such a prescription can be done to the limit of six months from the prescription issue (this period can be prolonged by the physician up to 1 year).
3) prescriptions for systemic antibiotics and antimicrobial chemotherapeutics - 5 days (including the day of the prescription issue), apart from medical products for local use. Prescription validity for these medical products used locally is 14 days.

4) prescriptions issued by emergency services or in situations “danger in delay” are valid on the day of issue and the next day

Generally, we distinguish between two main types of prescription: prescription of individually prepared preparations (IPP) and ready-made preparations (RMP). Note: ready-made preparations are sometimes also called mass-produced drugs (MPD). Individually prepared preparations are prepared in pharmacies, whereas ready-made preparations are produced in pharmaceutical factories and distributed into pharmacies by manufacturers (pharmaceutical companies) and distributors. There is a marked increasing trend in the use (and prescription) of RMP at the present time both in human and veterinary medicine.

2.2. Prescription of individually prepared preparations (IPP)

Formal parts of IPP prescription:

Inscriptio (heading) - contains specifications concerning legal entity that issued the prescription such as name, surname, address of ordination, phone, eventually a name of the veterinary facility. This part may be pre-printed on the veterinary form.

Example of heading for a veterinary facility:

Small Animal Clinic
7/9 Nicholson Street
QH35OP Edinburgh
Phone: 254 456 459

Example of heading for a private veterinarian:

John Smith, D.V. M.
7/3 East Newington Place
EH91QP Edinburgh
Phone: 235 698 367
Reg. num. 456 98
**Invocatio (address)** - expressed by abbreviation Rp. *(recipe = take).* Rp. is pre-printed on the form. Prescribing veterinarians ticks this abbreviation at the end of writing and it indicates that they checked up the prescription and that it was correct.

**Praescriptio (prescription)** - contains list of all curative substances, supplementary substances and pharmaceutical excipients that should be involved in the preparation. These substances are listed using Latin pharmacopoeial names in second cases (genitives of singular). Each substance must be written on separate row and its name starts with capital letter. Individual substances are written in prescription in a settled order (that takes into account their importance and efficiency):

*remedium cardinale* - substance with the main curative effect

*remedium adiuvans* - supplementary substance that intensifies the effect of *remedium cardinale* or attenuates possible adverse effects

*remedium corrigens* - improves unpleasant taste, appearance, solubility, pH, stability, aroma, etc. of the medical preparation

*remedium constituens (vehiculum)* - pharmaceutical excipient, indifferent auxiliary substance that mainly contributes to the final drug dosage form

Doses of substances listed are expressed in grams (using Arabic numerals). The abbreviation “g” is not written. Even in the case that the amount of a substance is represented by whole number, decimal point must not be omitted (e.g. 10.0). If a component is liquid and its dose is less than one gram it can be given as drops using adverb “guttatim” usually abbreviated as “gtts.” (by drops).

The amount of *remedium constituens* is given in the last row of the prescription. Its amount is in most cases not mentioned directly but using preposition “ad” before the dose that expresses the whole amount of prescribed medicinal product.
Example:

Pilocarpini hydrochloridi 0.2
Lactosi 0.5

or much more usual way:

Pilocarpini hydrochloridi 0.2
Lactosi ad 0.7

In some cases two or more consecutive substances in the same prescription can be of the same doses. In this case there is no need to mention doses of each substance but only for the last of these components and write before it “aa” (abbreviation of *ana partes aequales* = in equal portions). It indicates to the pharmacist that also amounts for all substances written above (that are without doses) are the same.

Example:

Pilocarpini hydrochloridi
Papaverini hydrochloridi aa 0.5

The pharmacist will take 0.5 grams of each of these substances and the total amount will be 1.0 gram.

In addition, the abbreviation “aa” can be used in combination with preposition “ad”. This can be done only in the last row and in most cases for the case of *remedium constitutens*.

Example:

Pilocarpini hydrochloridi
Papaverini hydrochloridi aa ad 1.0
**Subscriptio (subscription)** - contains instructions for the pharmacist how the medicinal product should be prepared. The first direction in subscription is what drug dosage form should be created. This is done by expression *Misce fiat* = mix to make (sg.) or *Misce fiant* (pl.) plus the required drug dosage form in Latin. The expression *Misce fiant/fiant* is commonly abbreviated as *M. f.*

Examples:

*M. f. solutio* = Mix to make solution

*M. f. unguentum* = Mix to make unguent

*M. f. pulvis* = Mix to make powder

Note: drug dosage forms are also frequently abbreviated according to the list of acceptable abbreviations (*M. f. sol.*, *M. f. ung.*, *M. f. pulv.*).

If there is a need to divide the preparation into more individual therapeutic doses, the instructions should be written also in this part of the prescription using either dispensed or divided form (for more detailed description see below) which is expressed by two means and the required amount of the doses is indicated by Roman numeral:

Example:

*Dentur tales doses No. X (decem)* usually abbreviated as *D. t. d. No. X (decem)* - Give such doses (dispensed form)

or

*Divide in doses aequales No. X (decem)* usually abbreviated as *Div. in dos. X (decem)* - Divide into (equal) doses (divided form)
The doctor can in this part of the prescription also instruct the pharmacist how should be the prepared medical product issued (adjusted).

Example:

*Ad ollam*  
Into jar

*Ad capsulas gelatinosas*  
Into gelatine capsules

*Ad vitrum guttatum*  
Into a dropper container

*Ad lag(o)enam fuscam*  
Into a dark bottle

Note: the types of adjustment are also frequently abbreviated according to the list of acceptable abbreviations (*Ad caps. gelat.*, *Ad vitr. gutt.*, *Ad lag. fusc.*).

If some tools for application shall be added, it should be indicated also in signature.

Example:

*Adde bacillum vitreum (Adde bac. vitr.)*  
Add vitreous stick

*Adde guttatorium (Adde gutt.)*  
Add dropper applicator

If we want to ensure so that the prescription can be used repeatedly, we write in this part of prescription expression *Repetatur* (It is being repeated) and the appropriate multiple of number. Repeated use of such a prescription can be done to the limit of six months from the prescription issue (this period can be prolonged by the physician up to 1 year).

Example:

*Repetatur ter*  
It is being repeated three times
Contrary to the meaning of this expression, the prescription is going to be issued three times in total.

Finally, also other additional instructions for the pharmacists should be given in this part of prescription.

Example:

*Sub signo veneni (Sub sign. ven.)*  Marked as poison
*Sterilisa!*  Sterilize!
*Filia!*  Filter!

**Signatura (signature, instructions on use)** - should be written in a language understandable for the patient’s owner. It must contain exact instructions on how the medicinal product is to be used. This part of prescription starts with the abbreviation *D. S. (Detur et Signetur)* which means “It is being given and it is being marked”. It must contain instruction “how”, i.e. route of application, “where”, i.e. site of application, “how much/many”, i.e. simple dose, “how frequently”, i.e. daily dose, “how long time”, i.e. therapeutic dose and finally animal species for which the medicinal product was prescribed.

If veterinarians write a prescription for use in their own practice, they have special possibilities how to fill in signature. Expression *Suo nomine* abbreviated as *S. n.* - with its name (i.e. of the drug) is frequently used in cases when the prescribed medical product has a well-known or easily deductive name (e. g. Jarisch solution) and this name is then written by pharmacist on the package of the medical product. Another possibility is represented by expression *Cum formula* commonly abbreviated as *C. f.* - with a copy of the prescription (the whole formula). Pharmacist will write the complete composition of the medical product on the package of the medical product. Finally, veterinarians can fill in this part of the prescription with a name that they wish to be written on the package (e. g. Solution for treatment of septic wounds).

**Dies (date of prescription issuing)** - located usually at the bottom of the prescription form.
**Nomen et sigillum medicii veterinarii** (name and stamp of the veterinarian) - name and signature of veterinarian who wrote the prescription.

**Nomen possessoris** (name of the animal’s owner) - it should contain name, surname and address of the animal’s owner, possibly phone number. This part of the prescription starts with preposition “Pro:” which means “for”. If veterinarians write prescription for their own practice, than they use in **Nomen possessoris** some of the following expressions: *Pro ordinatione* (For use at the doctor’s), *Pro praxis mea* (For my practice).

Example of a complete prescription of an IPP:

Rp.  
Ammonii bromidi 5.0  
Natrii bromidi  
Kali bromidi aa 10.0  
Sirupi simplicis 30.0  
Aquae purificatae ad 300.0  
M. f. liquidum peroralium  
D. S. Give one spoon of the solution to  
the dog three times a day, for 5 days  

Date Name and stamp  

Pro: Peter Clarke, 78 Upper Street,  
BT96RT Brighton

**IPP prescription of divided drug dosage forms:**

As has been already mentioned, there could be a need to divide the preparation into more individual therapeutic doses. For such purposes we can use two ways of prescription and for the purposes of explanation we will use prescription of divided powder.
In the case of **dispensed form** we will give in the part *Praescriptio* the dose of each component for one powder (that will be finally adjusted in one gelatinous capsule). In the part *Subscriptio* we will give the number of doses that will be prepared by the pharmacist according to the instruction *Dentur tales doses numero* (abbreviated as *D. t. d. No.*). In this part of prescription we will also express that the divided doses should be adjusted into gelatinous capsules using expression *Ad capsulas gelatinosas*.

In the case of **divided form** we will give in the part *Praescriptio* the dose of every component that is necessary for preparation of the total amount for all prescribed doses. In other words we must multiply the individual doses of all components by the number of total doses. In order to ask the pharmacist for using of this form, we will use in the part *Subscriptio* expression *Divide in doses aequales numero* (abbreviated as *Div. in dos. No.*). Similarly to the previous form, we will in this part of prescription also express that the divided doses should be adjusted into gelatinous capsules using expression *Ad capsulas gelatinosas*.

Examples:

**Dispensed form:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papaverini hydrochloridi</td>
<td>0,05</td>
</tr>
<tr>
<td>Lactosi</td>
<td>ad 0,4</td>
</tr>
<tr>
<td>M. f. pulvis</td>
<td></td>
</tr>
<tr>
<td>D. t. d. No. X (decem)</td>
<td></td>
</tr>
<tr>
<td>Ad capsulas gelatinosas</td>
<td></td>
</tr>
<tr>
<td>D. S. S. n.</td>
<td></td>
</tr>
</tbody>
</table>

**Divided form:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papaverini hydrochloridi</td>
<td>0,5</td>
</tr>
<tr>
<td>Lactosi</td>
<td>ad 4,0</td>
</tr>
<tr>
<td>M. f. pulvis</td>
<td></td>
</tr>
<tr>
<td>Div. in dos. No. X (decem)</td>
<td></td>
</tr>
<tr>
<td>Ad capsulas gelatinosas</td>
<td></td>
</tr>
<tr>
<td>D. S. S. n.</td>
<td></td>
</tr>
</tbody>
</table>

It is easier for a doctor to use the dispensed form of prescription, because there is lower risk of mistakes during the doses calculation.

**IPP prescription of divided drug dosage forms combined with expression *quantum satis***:

Some drug dosage forms can be prescribed without specification of the vehicle amount and the final vehicle dose can be determined by the pharmacist. In such cases we will use in the prescription expression *Quantum satis* (usually abbreviated as *q. s.*), which means “as many as necessary”.
If we use dispensed form, we give the individual components of prescription and their amounts for one dose (capsule, suppository, etc.). Then we give the name of vehicle, instead of the amount we use the abbreviation q. s. and then we continue with instruction for the creation of the appropriate dosage form using expression *ut fiat*, which is followed by instruction concerning the number of doses *D. t. d. No.*

Example:

Papaverini hydrochloridi 0.05
Lactosi q. s. ut fiat pulvis
D. t. d. No. X (decem)
Ad capsulas gelatinosas
D. S. S. n.

In some cases even choice of vehicle can be left to be determined by the pharmacist. In this type of prescription we list the other components of prescription, followed by instructions concerning the drug dosage form and number of doses.

Example:

Papaverini hydrochloridi 0.05
M. f. pulvis
D. t. d. No. X (decem)
Ad capsulas gelatinosas
D. S. S. n.

If we used divided form, we give the individual components of prescription and their doses for the total amount of the required medical product. Further we give the name of the vehicle, instead of the amount we use the abbreviation q. s. and then we continue with instruction for the creation of the appropriate dosage form using expression *ut fiat*, which is followed by instruction concerning the number of doses.

Example:

Papaverini hydrochloridi 0.5
Lactosi q. s. ut fiant plv. No. X (decem)
Ad capsulas gelatinosas
D. S. S. n.
Also here, the choice of vehicle can be in some cases left to be determined by the pharmacist.

Example:

Papaverini hydrochloridi 0.5
M. f. plv. No. X (decem)
Ad capsulas gelatinosas
D. S. S. n.

2.3. Prescription of ready-made preparations (RMP)

Formal parts of RMP prescription:

Inscriptio (heading) - the same rules as for IPP.

Invocatio (address) - the same rules as for IPP.

Praescriptio (prescription) - contains the full registered name of the appropriate ready-made preparation in the first case. These names can be found in various publications about registered medical products and must be written in the full form even if they include names of pharmaceutical companies. As majority of ready-made products is manufactured in several doses or concentrations as well as in different contents of the packages, the strength and eventually size of the package should be mentioned on the second line just below the registered name.

Example:

DEGAN 10 mg por. tbl. nob.
40 x 10 MG

Subscriptio (subscription) - informs the pharmacist how many original packages should be issued using expression Expeditio originalis in the fourth case of singular or plural.
Expeditionem originalem numero unam
Expeditiones originales numero duas

This expression is nevertheless used in its abbreviated form Exp. orig. and followed by Latin abbreviation for number (No.), Roman numeral and numeral in words in parentheses.

Exp. orig. No. II (duas)

Example of parts Praescriptio and Signatura in RMP:

ITOPRID PMCS 50 mg por. tbl. flm.
100 x 50 MG
Exp. orig. No. IV (quattuor)

**Signatura (signature, instructions on use)** - the rules for this part of prescription are very similar as for IPP. It should be repeated that Signatura must be written in a language understandable for the patient’s owner. It can contain shorter instructions on how the medicinal product is to be used, because RMPs have some information concerning application on their packages and they contain leaflet. Thus, Signatura should include particularly dosage regimen and animal species. We must not use expression Cum formula (C. f.) and Suo nomine (S. n.) can be used only when medical product is prescribed for our own practice. This expression should be used also in cases when product is registered entirely for administration by physician.

**Dies (date of prescription issuing)** - the same rules as for IPP.

**Nomen et sigillum medicii veterinarii (name and stamp of the veterinarian)** - the same rules as for IPP.

**Nomen possessoris (name of the animal’s owner)** - the same rules as for IPP.
Example of a complete prescription of a RMP:

Rp.
GANATON por. tbl. flm.
40 x 50 MG
Exp. orig. No. III (tres)
D. S. S. n.

Date Name and stamp

Pro: praxis mea
3. Drug dosage forms (S. Pejřílová)

3.1. Definition

Pharmaceutical drug dosage form (DF) determines the physical appearance of the final pharmaceutical preparations. Dosage form may have a significant impact on the active substance characteristics. Dosage form is made of mixture of active drug components and nondrug components (pharmaceutical excipients). There can be more active substances, more nondrug components or without nondrug components. Dosage form is a drug delivery system which is formed by technological processing (drug formulation). Dosage form must reflect therapeutic intentions, route of administration, dosing etc.

3.2. Classification of drug dosage forms

There are various classes of DF and we can distinguish DF from various points of view.

3.2.1. Classification according to the route of administration

- Oral DF
- Parenteral DF
- External DF
  - Dermatological DF – for administration on the surface of body with local effect (skin, mucous membranes)
  - DF into body cavities – for administration into accessible body cavities (topical)
  - Inhalational DF – for application via inhalation
  - Transdermal DF – for administration on the surface of the body with systemic effect
3.2.2. Classification according to the consistence

- Solid DF
- Semisolid DF
- Liquid DF
- Gaseous DF

- Non-specific in shape (without specific physical shape) – e.g. ointment, oral powder
- Specific in shape (with specific physical shape) – e.g. suppository, tablet

3.2.3 Classification according to the generations

- 1st generation – conventional (unmodified) release of the active substance
- 2nd generation – controlled release of the active substance
- 3rd generation – targeted distribution drug delivery system

3.3. Summary of the drug dosage forms

3.3.1. Oral drug dosage forms

Solid DF

**DF non-specific in shape (officinal)**

*Pulveres perorales*, Powders, oral

*Granulata*, Granules

*Praeadmixta ad alimenta medicata ad usum veterinarium*, Premixes for medicated feeding stuffs for veterinary use

**DF specific in shape (officinal)**

*Tabulettae*, Tablets

*Capsulae*, Capsules

*Preparationes intraruminales*, Intraruminal devices

**Non-officinal veterinary DF**
Lictum, Mineral lick
Bolus, Mouthful

Semisolid DF

**Non-official veterinary DF**

*Pasta peroralis*, Oral paste

Liquid DF

*Praeparationes liquidae peroraliae*, Liquid preparations for oral use

*Solutiones, Suspensiones, Emulsiones perorales*, Oral solutions, emulsions and suspensions

*Pulveres et granula pro solutione et suspensione perorales*, Powders and granules for oral solutions and suspensions

*Guttae perorales*, Oral drops

*Pulveres pro guttis peroralibus*, Powders for oral drops

*Sirupi*, Syrups

*Pulveres et granula pro sirupis*, Powders and granules for syrups

3.3.2. Parenteral drug dosage forms

Liquid DF

*Iniectiones*, Injections

*Infusiones*, Infusions

*Concentrata pro iniectionibus aut infusionibus*, Concentrates for injections or infusions

Semisolid DF

*Gelata pro iniectionibus*, Gels for injections

Solid DF

**DF non-specific in shape**

*Pulveres pro iniectionibus aut infusionibus*, Powder for injections or infusions
DF specific in shape

*Implantata, Implants*

3.3.3. External drug dosage forms (administered on skin/mucous membranes)

Solid DF

**DF non-specific in shape**

*Pulveres adspersorii, Powders for cutaneous application*

**DF specific in shape (non-officinal)**

*Collar*

Semisolid DF

*Praeparationes molles ad usum dermicum, Semi-solid preparations for cutaneous application*

*Unguenta, Ointments*

*Pastae, Pastes*

*Cremores, Creams*

*Gelata, Gels*

*Cataplasmata, Poultices*

*Emplastra medicata, Medicated plasters*

Liquid DF

*Praeparationes liquid ad usum dermicum, Liquid preparations for cutaneous application*

*Spumae cutanae, Cutaneous foams*

*Saponata, Shampoos*

*Praeparationes liquidae veterinae ad usum dermicum, Veterinary liquid preparations for cutaneous application*

*Concentrata pro balneo, Dip concentrates*

*Saponata, Shampoos*

*Spumae cutanae, Cutaneous foams*

*Infusiones dorsales, Pour-on preparations*
Praeparata cutanea, Spot-on preparations
Aerodispersiones, Sprays
Balnea maceratoria mammillarum, Teat dips
Aerodispersiones pro mammillis, Teat sprays
Lotiones pro glandula mammaria, Udder-washes

Non-officinal DF
Linimenta, Liniments
Pulveres adspersorii liquidi, Shake lotions
Lotiones, Lotions

3.3.4. Topical drug dosage forms (administered into accessible cavities)

Specific body cavities
Ophthalmica, Eye preparations
Auricularia, Ear preparations
Nasalia, Nasal preparations
Rectalia, Rectal preparations
Vaginalia, Vaginal preparations
Praeparationes intrauterinae ad usum veterinarium, Intrauterine preparations for veterinary use
Praeparationes intramammariae ad usum veterinarium, Intramammary preparations for veterinary use
Praeparationes buccales, Oromucosal preparations

Non-specific body cavities
Styli, Sticks
Tamponae medicatae, Medicated tampons
Praeparationes ad irrigationem, Preparations for irrigation
Praeparationes pharmaceuticae in vasis cum pressu, Pressurised pharmaceutical preparations
Musci medicati, Medicated foams
3.3.5. Drug dosage forms for inhalation (inhalanda)

_Inhalanda liquida_, Liquid preparations for inhalation
_Pulveres ad inhalationem_, Powders for inhalation

3.3.6. Transdermal dosage forms (administered on the skin with systemic effect)

_Emplastra transcutanea_, Transdermal patches

3.4. Description of the individual drug dosage forms

3.4.1. Oral drug dosage forms

Oral administration of medicinal products is a non-invasive way, via oral cavity. Absorption occurs in GIT and leads to generally systemic effect. This route of administration is one of the safest; there is good compliance in the case of flavoured DF. In addition, it is suitable for animals. This administration can carry out the owner or breeder; in this case it is economical and basic advantage. The main disadvantages are slow onset of action, risk of irritation of gastrointestinal mucosa (e.g. non-steroidal anti-inflammatory drugs), alteration of the digestive process by the drugs (e.g. antibiotic agents). The presence of food can adversely alter absorption of active substance. This route of administration is not suitable in some specific cases, for example: vomiting animals, unconscious patients, and aggressive or stressed animals.

Specific oral veterinary DFs can be administered using mass administration, usually in food or drinking water. Mass drug administration means flock or herd medication. This is usually used in farms with livestock or poultry.

It is critical that oral dosage forms are flavoured or tasteless. Formulation of flavoured oral DFs is supplemented by adding food-based products or flavour ingredients. Flavoured oral forms are palatable and suitable for better and safer intake of medication by animal itself. In general, the tastes are preferably used according to the individual tastes of animal species (dogs are insensitive to salt and prefer pork, beef and chicken, cats are insensitive to both salt and sugar and prefer fish).
**Solid drug dosage forms**

**Oral powders**

Oral powders are solid DFs, non-specific in shape. Correct officinal name is *Pulveres perorales*, we can use abbreviation *plv*.

This type of DF is a preparation consisting of solid, loose, dry particles of varying degrees of fineness, from fine-grained to coarse. Fine-grained powders (*pulvis subtilis*) are the most frequent. They contain one (*pulvis simplex*) or more active substances (*pulvis compositus*), with or without excipients. Typical vehicle is milk sugar (*Lactosum*) and saccharose (*Saccharosum*).

They are generally administered in or with water, another suitable liquid or with food. They are presented as a single-dose or multidose preparations.

We distinguish two main types of Oral Powders:

1. Non-divided oral powders – *Pulveres nondivisi*
2. Divided oral powders – *Pulveres divisi*

**Non-divided oral powders** are multidose preparations for repeated administration of single doses.

It is dosage form, which is prescribed and prepared in the whole amount (it means dosage for whole therapy – *dosis pro cura*). Individual single doses are used with added calibrated vessel or measuring jug (tea spoon, soup spoon, point of knife). Details in used calibrated vessels or measuring jug (amount / number of single doses) must be described in the part of prescription *Signatura* (Instructions on use). This is very important information for owner of the patient. Typical packaging is common paper bag, if the content consists of volatile ingredients container must be airtight: plastic gallipot, waxed paper, jar or bottle.

Never prescribe this type of DF for very strong effective drugs and strong effective drugs (e.g. antibiotics, painkillers), because there is a risk of incorrect dosage and drug overdose.

**Divided oral powders** are single-dose preparations. These DFs are prescribed and used in the single therapeutic doses. Each dose is enclosed in an individual container. Typical single dose weight is in range 0.1 - 1.0 g for human use. Single dose weight is not determinate in use in the veterinary practice. Very strong effective drugs and strong effective drugs can be administered using this DF, because there is clearly defined amount of the active substance in one single dose.
There can be more types of containers: sachet, gelatinous capsule and small paper or waxed bag. Sachet (pronounced sash-ey), in latin charta, is special waxed wrapping. Sachet has tubular shape and the ends of sachet, after filling of powder, slide into themselves. Content of sachet is emptied into the water or food directly before administration. If we use this type of container in prescription, we have to prescribe instruction: Da ad chartas, Give to a sachet. However, gelatine capsules predominate nowadays.

Pharmacopoea determinates a variant **Effervescent powders**, *Pulveres efervescentes*. Effervescent powders are ready-made preparations. They are presented as single-dose or multidose preparations and generally contain acid substances and carbonates or hydrogen carbonates which react rapidly in the presence of water to release carbon dioxide. Thanks this process final drink is homogenous and active substance is well dispersed in solution. They are intended to be dissolved or dispersed in water before administration. Effervescent powders are susceptible to moist, container must be airtight.

**Granules**

Granules are solid DF, non-specific in shape. Correct officinal name is **Granulata**, in abbreviation *gra*.

This type of DF is preparation consisting of solid, dry aggregates of powder particles sufficiently resistant to handling. Granules contain one or more active substances with or without excipient. They are presented as single-dose or multidose preparations. Each dose of a multidose preparation is administered by device suitable for measuring the quantity prescribed. For single-dose granules, each dose is enclosed in an individual container, for example a sachet or a vial.

Several categories of granules may be distinguished:

- **Effervescent granules**, *Granula effervescentia* – are uncoated granules generally, similar content as effervescent powders. They are intended to be dissolved or dispersed in water before administration. They are single-dose or multidose preparations.

- **Coated granules**, *Granula obducta* – are usually multidose preparations and consist of granules coated with one or more layers of mixtures of various excipients.

- **Gastro-resistant granules**, *Granula enterosolventia* – are delayed-release granules that are intended to resist the gastric fluid and to release the active substance/s in the
intestinal fluid. These properties are achieved by covering the granules with a gastro-resistant (enteric-coated granules) or by other suitable materials.

- **Modified-release granules.** *Granula cum liberatione modificata* – are coated or uncoated. They contain special excipients or are prepared by special procedures, or both, designed to modify the rate, the place or the time at which the active substance/s are released.

**Premixes for medicated feeding stuffs for veterinary use**

Premixes are mixtures of one or more active substances, usually in suitable bases. This is a veterinary product prepared in advance with respect to the subsequent manufacturing of medicated feeding stuffs.

Premixes occur in granulated, powdered, semi-solid or liquid form. Used as powders or granules, they are free-flowing and homogeneous; any aggregates break apart during normal handling. Used in liquid form, they are homogeneous suspensions or solutions. The particle size and other properties ensure the uniform distribution of the active substance/s in the final feed. Unless otherwise justified and authorised, the instructions for use state that the concentration of a premix in a granulated or powdered form is at least 0.5 per cent in the medicated feeding stuff.

**Tablets**

Tablets are solid DF, specific in shape. They are prepared as ready-made preparations by compressing uniform volumes of particles. Tablets are usually intended for oral administration and are the most widely used dosage forms in general. Some are swallowed whole, some after being chewed, some are dissolved or dispersed in water before administration and some are retained in the mouth where the active substance is liberated. The use of tablets is limited to small animals, especially for dogs and cats, in veterinary practice.

Each tablet contains a single dose of one or more active substances and typical is content of excipients. The excipients can include diluents, binders, granulating agents, looseners, slippery and antiadhesive compounds to ensure efficient tabletting, disintegrants to promote tablet break-up in digestive tract, sweeteners or flavours to enhance taste, colouring matter to
make the tablets visually attractive, substances capable modifying the behaviour of the preparation in the GIT, etc.

Tablets can be produced in a wide variety of sizes, shapes, and surface marking. They are usually straight, circular solid cylinder, the end surfaces of which are flat or convex and the edges of which may be bevelled. They may have break-marks for facile dividing of tablets and may bear a symbol or other marking. Tablets with special coatings (for example enteric coatings or controlled-release coatings) should not be broken before use.

Typical immediate wrapping is the pre-formed plastic packaging, blister pack. Blister packs are commonly used as unit-dose packaging for pharmaceutical tablets, capsules or lozenges. Typical outer packaging is paper box/pack.

Pharmacopoea describes several categories of tablets for oral administration:

- **Uncoated tablets, Tabulettae nonobductae** – can be as a single-layer tablets resulting from a single compression of particles or multi-layer tablets consisting of layers obtained by successive compression of particles of different composition.

- **Coated tablets, Tabulettae obductae** – are tablets covered with one or more layers of mixtures of various substances such as natural or synthetic resins, gums, gelatine, inactive and insoluble fillers, sugars, waxes, colouring matter, flavouring substance. We distinguish two types, film-coated tablets (very thin coating) and dragée (more layers on surface). Coated tablets have a smooth surface, which is often coloured and may be polished.

- **Effervescent tablets, Tabulettae effervescentes** – are uncoated tablets generally containing weak organic acid and carbonates or hydrogen carbonates, which react rapidly in the presence of water to release carbon dioxide. They are intended to be dissolved or dispersed in water before administration.

- **Soluble tablets, Tabulettae pro solutione** – are uncoated or film-coated tablets. They are intended to be dissolved in water before administration. The solution produced may be slightly opalescent due to the added excipients used in the manufacture of the tablets.

- **Dispersible tablets, Tabulettae pro dispersione** – are uncoated or film-coated tablets intended to be dispersed in water before administration, giving homogeneous dispersion.
• **Orodispersible tablets**, *Tabulettae perorales pro dispersione* – are uncoated tablets intended to be placed in the mouth where they disperse rapidly before being swallowed.

• **Gastro-resistant tablets**, *Tabulettae enterosolventes* – are delayed-release tablets that are intended to resist the gastric fluid and to release their active substance/s in the intestinal fluid. Usually they are prepared from granules or particles already covered with a gastro-resistant coating or in certain cases by covering tablets with gastro-resistant coating (enteric-coated tablets).

• **Modified-release tablets**, *Tabulettae cum liberatione modificata* – are coated or uncoated tablets containing special excipients or are prepared by a special process designed to modify the rate, the place or the time at which the active substance/s are released. Modified-release tablets include prolonged-release tablets, delay-release tablets and pulsatile-release tablets.

• **Tablets for use in the mouth (Oromucosal preparations)**, *Tabulettae orales* – are usually uncoated tablets. They are formulated to ensure a slow release and local action of the active substance/s or the release and absorption of the active substance/s at a defined part of the mouth.

**Capsules**

Capsules are solid, conical-shaped, single dose preparations with hard or soft shell of various shapes and capacities, usually containing a single dose of active substance/s. Correct officinal name is *Capsulae*, in short *cps*.

Capsules are modern and practical dosage forms. They are manufactured both as individually prepared preparations and ready-made preparations. This is dosage form in which the active substance/s and excipients are enclosed within a soluble container or shell. The content of capsules can be solid, liquid or of a paste-like consistence. The content does not cause deterioration of the shell. The shell, however, is attacked by the digestive fluids and the contents are released. The capsule shells are made of gelatine or other substance as cellulose polymers. Typical is content of excipients, such as surface-active agents, opaque fillers, antimicrobial preservatives, sweeteners, colouring matter. The capsules may bear surface markers.

There are five categories of capsules:
• **Hard capsules**, *Capsulae durae* – are two-piece capsules consisting of two prefabricated cylindrical section, each of which has one rounded, closed end and one open end (telescoping cap and body pieces). The active substance/s, usually in solid form (powder or granules), are filled into one of the sections that is closed by slipping the other section over it.

• **Soft capsules**, *Capsulae molles* – are one-piece capsules with thicker shell than those of hard capsules. The shell consists of a single part and is of various shapes. Soft capsules are usually formed, filled and sealed in one operation, and this is reason why these DFs are produced only as RMP. Contents with active substances may be in liquid or solid consistence. Liquid can be enclosed directly; solids are usually dissolved or dispersed in a suitable vehicle to a give solution or dispersion of a paste-like consistency. The shell material may contain an active substance.

• **Gastro-resistant capsules**, *Capsulae enterosolventes* – are delayed-release capsules that are intended to resist the gastric fluid and to release their active substance/s in the intestinal fluid.

• **Modified-release capsules**, *Capsulae cum liberatione modificata* – are hard or soft capsules in which contents or the shell or both include special excipients or are prepared by a special process designed to modify the rate, the place or the time at which the active substance/s are released. Modified-release capsules include prolonged-release and delay-release capsules.

• **Cachets**, *Capsulae amylaceae* – are solid preparations consisting of a hard shell containing a single dose of active substance/s. The cachet shell is made of unleavened bread usually from rice flour and consists of two prefabricated flat cylindrical sections. Before administration, the cachets are immersed in water for a few seconds, placed on the tongue and swallowed with draught water.

**Intraruminal devices**

Intraruminal devices are specific veterinary dosage forms for prevention and/or therapy in the ruminant animals. They are intended for oral administration and are designated to be retained in the rumen to deliver the active substance/s in a continuous or pulsatile manner. They are solid preparations each containing one or more active substances. The period of release of the active substance/s may vary from days to weeks according to the nature of the formulation and/or the delivery device.
Intraruminal devices may be administered using a balling gun. Some intraruminal devices are intended to float on the surface of the ruminal fluid while others are intended to remain on the floor of the rumen or reticulum. Each device has a density for its intended purpose.

**Block lick**

A block lick is a non-officinal veterinary dosage form. It is also known as salt lick, artificial salt lick, mineral lick or medicated block. This is a block of salt or artificial medicated saline preparation set out for wide assortment of animals, primarily herbivores e.g. cattle, sheep, deer, horses to lick. This dosage form is used for more reasons; supplement of their nutrition is typical – essentials nutrients like calcium, magnesium, sodium, and zinc. Next reason can be treatment with active substances from the group of antiparasitics. This dosage form is very suitable for prevention or therapy in shy animals or wildlife.

Block licks can be in two forms: blocked and bagged. Blocks can be installed directly on the ground, or mounted on platforms, hanged in the stable, in the pen.

Ruminants typically have free access to the block lick over several days and variable consumption may be problematic. In this case the active substance must be nontoxic, stable, palatable, and preferably of low solubility.

**Mouthful**

A mouthful is a non-official, historic, veterinary dosage form. Correct Latin name is *bolus*, or in English a pellet for animals. This dosage form was official in the past time, in the Czechoslovak Pharmacopoeia No. 2, valid until 1970. This is a single dose for oral administration for large animals. Shape is globular or egg-shaped. Their size is according to the size of animals. They usually weight more than 5 grams. Preparation was easy, there was combination of active substance with binders, and a typical binder was barley flour.

**Semisolid drug dosage forms**

**Oral paste**

An oral paste (*Pasta peroralis*) is a non-official veterinary semisolid dosage form. Pastes are popular dosage form for prevention or treating dogs, cats and horses, and can be easily and safely administered by owners. Typical examples are antiparasitic pastes for dogs, cats and
horses; pastes with vital vitamins, minerals and for example with taurine (a metabolite of the amino acid cysteine, which is essentials for cats); hairball pastes; etc. Commonly the pastes are flavoured by preferable tastes in individual animal species for their better and easy intake. Paste is a two-component semisolid drug dosage form in which drug is dispersed as a powder in a base (aqueous or fatty base). The vehicle containing the drug may be water, a polyhydroxy liquid such glycerine, propylene glycol, a vegetable oil, or mineral oil. Other excipients which are used in production include thickening agents, cosolvents, adsorbents, humectants, and preservatives. The thickening agents decide the degree of cohesiveness, plasticity and may be a naturally occurring material such as acacia or tragacanth, or a synthetic or chemically modified derivates such as xanthum gum. Microbial growth in the formulation is inhibited using a preservative.

**Liquid drug dosage forms**

Liquid preparations for oral use are usually solutions, emulsions or suspensions containing one or more active substances in a suitable vehicle.

Some preparations are prepared:
- by dilution of concentrated liquid preparations;
- or from powders or granules for the preparation of oral solutions or suspensions, using a suitable vehicle.

Basic characterization:

**Solution** means the active substance is dissolved in the vehicle.

**Emulsion** means mixture of unmiscible or hardly miscible substances, e.g. water and oil usually stabilized by means of appropriate emulsifier. Emulsion may show evidence of phase separation but readily re-dispersed on the shaking.

**Suspension** means that solid form such as a powder is dispersed in liquid. Suspension may show a sediment which is readily dispersed on the shaking.

Typical vehicles are water purified as aqueous vehicle (*Aqua purificata*); ethanol 60% as non-aqueous vehicle (*Ethanolum 60%*), and oily vehicles, linseed oil (*Lini oleum*), sunflower oil (*Helianthi oleum*), refined olive oil (*Olivae oleum raffinatum*), almond oil (*Amygdalae oleum*), refined peanut oil (*Arachidis oleum raffinatum*).

Pharmacopoeia describes several categories of liquid preparations for oral administration:
- Oral solutions, emulsions and suspensions, *Solutiones, emulsiones et suspensions perorales,*
• Powders and granules for oral solutions and suspensions, *Pulveres et granula pro solutione et suspensione perorales,*

• Oral drops, *Guttae perorales,*

• Powders for oral drops, *Pulveres pro guttis peroralibus,*

• Syrups, *Sirupi,*

• Powders and granules for syrups, *Pulveres et granula pro sirupis.*

**Oral Solutions, Emulsions and Suspensions**

Oral solution, emulsions and suspensions are supplied in single-dose or multidose containers. Each dose from a multidose container is administered by means of a device suitable for measuring the prescribed volume. The device is usually a spoon, a cup or an oral syringe for other volumes.

<table>
<thead>
<tr>
<th>Dosing measure</th>
<th>Approx. volume (ml)</th>
<th>Approx. weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 drop</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>1 teaspoonful</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>1 tablespoonful</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

**Powders and granules for oral solutions and suspensions**

Powders and granules are solid dosage forms intended for preparation of the solutions or suspensions. After dissolution of suspensions, they comply with requirements for oral solutions or suspensions.

**Oral drops**

Oral drops are solutions, emulsions or suspensions that are administered in small volumes (20 ml at most) such as drops by the means of a suitable device. They are typically adjusted into a dropper container (*vitrum guttatum*).

The label of RMP states the number of drops per millilitre of preparation or per gram of preparation if the dose is measured in drops. For correct prescribing of IPP we should know number of drops per millilitre of preparation according to chosen vehicle.

- 1 g of aqueous solution contains 20 drops
- 1 g of oily suspension contains from 40 to 50 drops
• 1 g of spirituous solution contains from 50 to 60 drops

**Powders for oral drops**

Powders for the preparation of oral drops are solid preparations intended for manufacturing of the oral drops. They may contain excipients to facilitate dissolution or suspension in the prescribed liquid or to prevent caking. After dissolution of suspensions, they comply with requirements for oral drops.

**Syrups**

Syrups are aqueous preparations characterised by a sweet taste and a viscous consistency. They may contain sucrose at a concentration of at least 45 %. The sweet taste can be also obtained by using other polyols or sweetening agents. Syrups usually contain aromatic or other flavouring agents. Each dose from multidose container is administered by means of a device suitable for measuring the prescribed volume.

**Powders and granules for syrups**

Powders and granules are solid dosage forms intended for preparation of syrups. After dissolution, they comply with requirements for syrups.

**3.4.2. Parenteral drug dosage forms**

The term parenteral is used when drug is administered through other than oral route or topical application and systemic action is required.

Parenteral preparations are sterile preparations intended for administration by

• injection,
• infusion, or
• implantation into human or animal body.

Common routes for parenteral administration of drugs involve intravenous (IV), intramuscular (IM) and subcutaneous (SC) ways for a quicker absorption. Other routes not frequently used include intracardic, intraperitoneal, epidural and intra-articular.
There are more advantages of parenteral routes. The first one is a rapid onset according to the route of administration. The onset occurs in seconds for IV and minutes for IM administration. The rapidity is extremely important for emergency in acute patients, or patients in unconsciousness or vomiting animals. In the case of implants (with long term release of active substance/s), one dosage form can be formulated to act days or even weeks, or months. On the other side, there are some disadvantages. It is the most dangerous route of administration because it bypasses most of the body’s natural defences, exposing the patients to health problems such as hepatitis, abscesses, infections, and so on. Parenteral administration can cause pain and stress reaction. The technique of administration must be aseptic and each approach must be in lege artis medicinae, it means according to the rules of art.

The most common parenteral dosage form is a stable aqueous solution in injections and infusions. Less frequently, the active components may be dissolved in an inert vegetable oil, which delay absorption. Typical aqueous vehicle is water for injection (Aqua pro injectione). Oily sterile vehicles may be sunflower oil (Helianthi oleum), or olive oil (Olivae oleum). Other kind of prolonged-release preparations include two DFs, implants and gels for injection.

Containers for parenteral preparations are made as far as possible from materials that are transparent to permit visual inspection of the content, except for implants. Typical containers are glass or plastic containers (vial, injection bottle) and pre-filled syringes. The plastic materials of closures are firm and elastic to allow the repeated passage of a needle into content of multidose preparation. Closures ensure a good seal that prevent the access of microorganisms and other contaminants.

**Liquid drug dosage forms**

**Injections**

Injections are sterile solutions, emulsions or suspensions. They are prepared by dissolving, emulsifying or suspending the active substance/s and any added excipients in water, in a suitable non-aqueous liquid, or in a mixture of these vehicles. Solutions for injection are clear and practically free from particles. Emulsions for injection do not show any evidence of phase separation. Suspensions for injection may show a sediment which is readily dispersed on shaking to give a suspension which remains sufficiently stable to enable the correct dose to be withdrawn.
Important note: The only accepted vehicle for aqueous injections should be water for injections (Aqua pro iniectione). This vehicle is sterile and pyrogen free. The final form intended for intravenous administration must be moreover isotonic and isoacidic solution to human blood.

Multidose aqueous injections contain suitable antimicrobial preservatives at an appropriate concentration except when the preparation itself has adequate antimicrobial properties. Aqueous preparations which are prepared using aseptic precautions and which cannot be terminally sterilized may contain a suitable antimicrobial preservative at an appropriate concentration.

Antimicrobial preservatives are not acceptable for administration:

- by routes where, for medical reasons, an antimicrobial preservative is not acceptable, such as intracisternally, epidurally, intrathecally or by any route giving access to the cerebrospinal fluid, or intra- or retro-ocularly,
- the volume to be injected in a single dose exceeds 15 ml.

Such preparations are presented in single-dose containers.

Typical containers in the RMPs are:

- single-dose preparation in a single-dose vial / ampoule,
- single-dose preparation in a pre-filled syringe,
- multidose preparation in a multidose vial, or injection bottle.

Typical container for individually prepared medicinal products is a bottle for injections or infusions (vitrum pro infuse).

**Infusions**

Infusions are sterile, aqueous solutions or microemulsions (very fine emulsions with defined diameter of micells) with water as the continuous phase. They are usually made isotonic with respect to blood. They are principally intended for administration in large volume, range 100 ml - 2 000 ml. Infusions do not contain any added antimicrobial preservatives. Solutions for infusion are clear and practically free from particles. Microemulsions for infusion do not show any evidence of phase separation.

Important note: The only accepted vehicle for infusions should be water for injections (Aqua pro iniectione).

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**Concentrates for injections or infusions**

These preparations are sterile solutions intended for injection or infusion after dilution. They are diluted to a prescribed volume with a prescribed liquid before administration. After dilution, they comply with the requirements for injections or for infusions.

**Semisolid drug dosage forms**

**Gels for injections**

Gels for injections are sterile gels with a viscosity suitable to guarantee a modified release of the active substance/s at the site of injection.

**Solid drug dosage forms**

**Powders for injections or infusions**

Powders for injections or infusions are solid, sterile substances distributed in their final container and which, when shaken with prescribed volume of a prescribed sterile liquid rapidly form either clear and practically particle-free solutions or uniform suspensions. After dissolution or suspension, they comply with the requirements for injections or infusions. The label of the container states the instruction for the preparation of injections and infusions.

**Implants**

Implants are sterile, solid preparations of a size and shape suitable for parenteral implantation and release of active substance/s over an extended period of time. Each dose is provided in a sterile container.

**3.4.3. External drug dosage forms (administered on skin and mucous membranes)**

Drug can be applied locally on the skin and its adnexa or on a variety of mucous membranes with expectation of local effects. Topical delivery can be defined as an application of a drug
on the skin to directly treat cutaneous disorders or the cutaneous manifestations of a general disease.

Several active substances are applied on the skin with expectation of systemic effects. These dosage forms are transdermal drug delivery systems (TDDS). TDDS are designed for affixing on healthy and clean skin in order to assure controlled drug delivery into the systemic circulation. Typical drug groups applied using TDDS are antiparasitic agents for prevention and/or therapy, substances for pain management and hormones.

The basic advantages of topical application involve easy administration and possible application by owners at home conditions. Typical problem can be possible ingestion in the treated animals by licking. It can lead to irritation of mucosa, stomach or drug intoxications after systemic absorption. Furthermore, skin irritation or contact dermatitis may occur due to the drug and/or excipients, allergic reaction and poor permeability of some drugs through the skin.

**Solid drug dosage forms**

**Powders for cutaneous application**

Powders for cutaneous application are preparations consisting of solid, loose, dry particles of varying fineness degree. They contain one or more active substance/s, with or without excipients and, if necessary, colouring matter. Powders are presented as single-dose powders or multidose powders.

Powders specifically intended for use on large open wounds or on severely injured skin must be sterile.

Typical containers for single-dose individually prepared preparations are common paper bags, in case when powder is susceptible to moist, container must be airtight, for example plastic galipot. Typical multidose ready-made preparation is packed in the sifter-top container, containers with a mechanical spraying device or in pressurized containers.

**Collars**

Collar is non-official topical dosage form, it belongs to modified release dosage forms and it is really frequently used in veterinary practice of small animals. We can use term insecticidal collar. The substance is usually incorporated into a matrix and released by diffusion followed
by dispersion through physical contact or released by vaporisation over a period of several months. Other release principals are also possible.

**Semisolid drug dosage forms**

Semisolid preparations are intended for local or transdermal delivery of the active substances, or for their emollient or protective action on the skin or mucous membranes. They are of homogeneous appearance. Typical and basic use is in dermatology and surgery. These preparations can be dangerous for animals due to possible ingestion by licking. It can result in irritation of mucosa, stomach and after systemic absorption lead to drug intoxication.

Semisolid preparations for cutaneous application consist of a simple or compound basis in which, one or more active substances are dissolved or dispersed. According to its composition, the basis may influence the activity of the preparation. The basis may consist of natural or synthetic substances and may be single phase or multiphase. According to the nature of the basis, the preparation may have hydrophilic or hydrophobic properties. Semisolid preparation intended for use on severely injured skin are sterile.

Hydrophobic basis inmiscible with water or tissue liquid, which means that semisolid prepared from these basis do not penetrate to deeper structures and their effects are mainly superficial. This is typical e.g. for white vaseline (*Vaselinum album*), yellow vaseline (*Vaselinum flavum*), pork lard (*Adeps suillus*) and white bee wax (*Cera alba*). Hydrophilic basis can mix with water and penetrate to deeper structures. *Macrogolum* can be named as a typical hydrophilic base.

**Ointments**

An ointment consists of a single-phase basis in which solids or liquids may be dispersed. Pharmacopoeia’s definition is that **ointments contain less than 25 % of solid particles**. An ointment must be homogeneous and does not contain sufficient water to separate into a second phase at room temperature. Correct officinal name is *Unguentum*, we can use abbreviation *ung.* for prescribing in individually prepared preparations. Typical ointments are based on petrolatum. Ointments are ideal emollients with good skin penetration and adherence to surface. Ointments are packaged in convenient containers such as tubes or jars.
**Pastes**

Pastes contain large proportions of solids finely dispersed in the basis. They are much stiffer than ointments due to presence of solids. Basic definition is that **pastes contain 25 – 50 % of solid particles**. Typical representatives of solid parts are starch, zinc oxide, calcium carbonate and talc. Correct officinal name is **Pasta**, we can use abbreviation **pst.** for prescribing in individually prepared preparations.

The base may be anhydrous (liquid or soft paraffin) or water soluble (glycerol or mucilage). Generally, pastes are intended for application to skin, in thick layer. Typical feature is stiff consistence. The pastes appear less greasy and are less penetrating and less macerating than ointments, so that they are preferred for acute lesions that have a tendency towards crusting, vesiculation, or oozing. Paste make particularly good protective barrier on the skin, like ointment, paste forms an unbroken and relatively water impermeable film on the skin surface. Pastes ordinarily do not flow at body temperature and thus can serve as occlusive (especially oily based pastes), protective coating. Pastes intended for application to large open wounds should be sterile.

**Creams**

Creams are multiphase preparations consisting of a lipophilic phase and an aqueous phase. Basic definition is that **creams are finer than ointments and contain more than 10 % of liquids**. Correct officinal name is **Cremor**, we can use abbreviation **crm.** for prescribing in individually prepared preparations.

Creams are very easily administered on the skin and hairy parts of the body; they are also suitable for application on mucous membranes. There are frequently used for their emollient, aqueous or cooling effect on the skin.

Creams are classified as emulsions of type water-in-oil or oil-in-water. Therefore, combining immiscible compounds is possible by mechanical agitation or heat. Typical container is jar, tubes and from time to time bottle with broad neck.

**Gels**

Gels (jellies) are modern dosage forms both ready-made and individually prepared preparations. They are semisolid systems consisting of dispersions of small or large molecules in an aqueous liquid or oily vehicle rendering jell-like through the addition of gelling agents.
They have transparent appearance. Correct officinal name is *Gelatum*, we can use abbreviation *gelat.* for prescribing in individually prepared preparations.

Among the gelling agents used are:

- Synthetic macromolecules: carbomers,
- Cellulose derivates: carboxymethylcellulose, hydroxypropylmethyl-cellulose.
- Polysiloxanes, liquid paraffin with aluminium oxide, zinc soap, polyethylene etc.

Typical advantages of use gels are easy application, good penetration of the active substance, no greasy effect, and easy removal from the skin.

**Poultices**

Poultices are paste-like preparations used externally to reduce pain and inflammation because they retain heat well. They consist of a hydrophilic heat-retentive basis in which solid or liquid active substances are dispersed. They are usually spread thickly on a suitable dressing and heated before application to the skin.

**Medicated plasters**

Medicated plasters are flexible preparation containing one or more substances. They are intended to be applied on the skin. They are designed to maintain the active substance/s in close contact with the skin such that these may be absorbed slowly, or act as protective or keratolytic agents.

Medicated plasters consist of an adhesive basis, which may be coloured, containing one or more active substances, spread as a uniform layer on an appropriate support made of natural or synthetic material. They are not irritant or sensitising to the skin. The adhesive layer is covered by a suitable protective liner, which is removed before applying the plaster on the skin. When removed, the protective liner does not detach the preparation from the outer, supporting layer.

Medicate plasters adhere firmly to the skin when gentle pressure is applied and can be peeled off without causing appreciable injury to the skin or detachment of the preparation from the outer, supporting layer.
**Liquid drug dosage forms, liquid preparations for cutaneous application**

Liquid preparations for cutaneous application are preparations of a variety of viscosities intended for local or transdermal delivery of active ingredients. They are solutions, emulsions or suspensions that may contain one or more active substances in a suitable vehicle. Emulsions may show evidence of phase separation but readily re-dispersed on shaking. Suspensions may show sediment that is readily dispersed on shaking to give a suspension as homogeneous preparation.

Preparations specifically intended for use on severely injured skin must be sterile. If the preparation is sterile, store in a sterile, airtight, tamper-proof container.

**Cutaneous foams**

Cutaneous foams comply with requirements of the monograph on Medicated foams.

**Shampoos**

Shampoos are liquid or, occasionally, semi-solid preparations intended for application to the scalp and subsequent washing away with water. Upon rubbing with water they usually form a foam.

They are emulsions, suspensions or solutions. Shampoos normally contain surface active agents.

**Liquid drug dosage forms, veterinary liquid preparations for cutaneous application**

Veterinary liquid preparations for cutaneous application are liquid products intended to be applied on the skin to obtain a local and/or systemic effect. They are solutions, suspensions or emulsions which may contain one or more active substances in a suitable vehicle. They may be presented as concentrates in the form of powders, pastes, solutions or suspensions, which are used to prepare diluted suspensions or emulsions of active substances. They may contain suitable antimicrobial preservatives, antioxidants and other excipients such as stabilisers, emulsifiers and thickeners. Cutaneous foams and shampoos were described previously.
Dip concentrates

Dip concentrates are preparations containing one or more active substances, usually in the form of powders, pastes, solutions or suspensions, which are used to prepare diluted solutions, suspensions or emulsions of active substances. The diluted preparations are applied by complete immersion of the animal into a medicated bath.

Pour-on preparations

Pour-on preparations contain one or more active substances for the prevention and treatment of ectoparasitic and/or endoparasitic infestations of the animals. They are applied in volumes which are usually greater than 5 ml by pouring along the animal’s dorsal midline.

Spot-on preparations

Spot-on preparations contain one or more active substances for the prevention and treatment of ectoparasitic and/or endoparasitic infestations of the animals. They are applied in volumes which are usually less than 10 ml, to a small area on the head or back of the animal.

Sprays

Sprays contain one or more active substances that are intended to be applied externally for therapeutic or prophylactic purposes. They are delivered in the form of an aerosol by the actuation of an appropriate valve or by means of a suitable atomising device that is either an integral part of the container or is supplied separately.

Teat dips

Teat dips contain one or more disinfectant active substances, usually in the form of solutions into which the teats of an animal are dipped pre- and post-milking, as appropriate, to reduce the population of pathogenic micro-organisms on the surface. Teat dips may be supplied / presented as ready-to-use preparations or they may be prepared by dilution of teat dip concentrates. Pre- and post-milking teat dips often differ in formulation. Teat dips usually contain emollients to promote skin hydration, to soften the skin and allow healing of lesions that would otherwise harbour bacteria.
Teat sprays

Teat sprays contain one or more disinfectant active substances, usually in form of solutions which are sprayed onto the teats of an animal pre- and post-milking, as appropriate, to reduce the population of pathogenic micro-organisms on the surface. Teat sprays may be supplied / presented as ready-to-use preparations or they may be prepared by dilution of teat spray concentrates. Pre- and post-milking teat sprays often differ in formulation. Teat dips usually contain emollients to promote skin hydration, to soften the skin and allow healing of lesions that would otherwise harbour bacteria.

Udder-washes

Udder-washes contain one or more disinfectant active substances, usually in form of solutions which are sprayed onto the udder and teats of an animal to remove mud and faecal contamination before the application of teat dips or sprays. Udder-washes are usually prepared by the dilution either of concentrated preparations or of ready-to use-teat dips or teat sprays.

Non-officinal liquid dosage forms

Liniments

Liniments are fluid, semi-fluid or, occasionally, semisolid preparations intended for application on the skin. They may be alcoholic or oily solutions or emulsions. Most of them are massaged into the skin (counter irritant or stimulating types) but some are applied on a warm dressing or with a brush (analgesic and soothing types). Liniments should not be applied onto injured skin.

Shake lotions

A solution or suspension of medication is the definition of a shake lotion. The name, shake lotion, comes from the fact that the solution is fine powders suspended in a liquid and must be shaken thoroughly before use. The advantages of using medicated shake lotions are that they are easy to apply and stick well to the skin area. A disadvantage of shake lotions is that they may dry too much when applied to acute lesions. Also, shake lotions do not penetrate thickened chronic lesions as well as creams or ointments.
Lotions

These are fluid preparations for external application without friction. They are clear solutions containing 25 – 50 % alcohol. Additional they may contain antiseptic, emollient, and haemostyptic substances.

3.4.4. Topical drug dosage forms (administered into accessible body cavities)

These dosage forms are intended for external non-invasive application into the accessible body cavities. We can expect local effect in most cases; nevertheless sometimes we administer these dosage forms also for systemic effect.

3.4.4.(a) Eye preparations

Eye preparations are sterile liquid, semi-solid or solid preparations intended for administration upon the eyeball and/or to the conjunctiva, or for the insertion in the conjunctival sac. We have five categories at disposal. These preparations must be stored in a sterile, airtight, tamper-proof container.

Eye drops

Eye drops are sterile aqueous or oily solutions, emulsions or suspensions of one or more active substances intended for instillation into the eye. This form is small-volume, up to 10 - 20 ml. Depending on the condition being treated they may contain antibiotics, analgesics, miotics and other groups of the drug. Eye drops sometimes do not contain any drug and are only lubricating and tear-replacing solutions. Correct officinal name is *Oculoguttae*, we can use abbreviation *oculogutt*, for prescribing in individually prepared preparations. Typical vehicle are *Aqua purificata*, purified water and *Aqua pro iniectione*, water for injections. Container for multi-dose preparations is a typical dropper container (plastic or glass) with dropper applicator. Eye drops intended for use in surgical procedures do not contain antimicrobial preservatives, and must be supplied in single-dose containers.
Eye lotions

Eye lotions are sterile aqueous solutions intended for rinsing or bathing the eye or for impregnating eye dressing. This form is in bigger volume, up to 100 ml. Eye lotions are practically clear and free of particles. Correct officinal name is *Aqua ophthalmica* for prescribing in individually prepared preparations.

Powders for eye drops and powders for eye lotions

Powders for the preparation of eye drops and eye lotions are supplied in a dry, sterile form to be dissolved or suspended in an appropriate liquid vehicle at the time of administration. After dissolution or suspension in the prescribed liquid, they comply with the requirements for eye drops or lotions, as appropriate.

Semi-solid eye preparations

Semi-solid eye preparations are sterile ointments, creams and gels intended for application to the conjunctiva or to the eyelids. They contain one or more active substances dissolved or dispersed in a suitable basis. They have a homogeneous appearance. The basis is non-irritant to the conjunctiva. Typical vehicle is simple eye ointment (*Unguentum ophthalmicum simplex*) - sterile pharmacopoieial excipient consisting of white vaseline, lanolin and beeswax - or only sterile white vaseline (*Vaselinum album*).

Semi-solid eye preparations are packed in small, sterilised collapsible tubes fitted or provided with a sterilised cannula. The containers contain at most 10 g of the preparation, unless otherwise justified and authorised. The tubes must be well-closed to prevent microbial contamination. Semi-solid eye preparations may also be packed in suitably designated single-dose containers. The containers, or the nozzles of tubes, are of such a shape as to facilitate administration without contamination.

Ophthalmic inserts

Ophthalmic inserts are sterile, solid or semi-solid preparations of suitable size and shape, designed to be inserted in the conjunctival sac, to produce an ocular effect. They generally consist of a reservoir of active substance embedded in a matrix or bounded by a rate-controlling membrane. The active substance, which is more or less soluble in lacrimal liquid,
is released over a determined period of time. Ophthalmic inserts are individually distributed into sterile containers.

3.4.4.(b) Ear preparations

Ear preparations are liquid, semi-solid or solid preparations intended for instillation, for spraying, for insufflations, for application to the auditory meatus or as an ear wash. Ear preparations usually contain one or more active substances in a suitable vehicle. They may contain excipients, for example, to adjust tonicity or viscosity, to adjust or stabilise the pH, to increase the solubility of the active substance, to stabilise the preparation or to provide adequate antimicrobial properties. The excipients do not adversely affect the intended medicinal action of the preparation or, at the concentrations used, cause toxicity or undue local irritation.

Preparations for application to the injured ear, particularly where the eardrum is perforated, or prior to surgery are sterile and supplied in single-dose containers. Ear preparations are supplied in multidose or single-dose containers, provided, if necessary, with a suitable administration device, which may be designed to avoid the introduction of contaminants.

Ear drops and sprays

Ear drops and ear sprays are solutions, emulsions and suspensions of one or more active substances in liquids suitable for application to the auditory meatus without exerting harmful pressure on the eardrum (e.g. water, glycols or fatty oils). They may also be placed in the auditory meatus by means of a tampon impregnated with the liquid. They are used to treat or prevent ear infections, especially really common infection of the outer ear and ear canal in small animals as dogs and cats. Correct official name for common prescribed ear drops is *Otoguttae*, we can use abbreviation *otogutt* for prescribing in individually prepared preparations.

Emulsions may show evidence of phase separation but readily re-dispersed on shaking. Suspensions may show a sediment, which is readily dispersed on shaking to give a suspension that remains stable to enable the correct dose to be delivered.

Ear drops are usually supplied in multidose containers of glass or suitable plastic material that are fitted with an integral dropper or with a screw cap of suitable materials incorporating a dropper and rubber or plastic teat. Alternatively, such a cap assembly is supplied separately.

Ear sprays are usually supplied in multidose containers fitted with an appropriate applicator.
Semi-solid ear preparations

Semi-solid ear preparations are intended for application to the external auditory meatus, if necessary by means of a tampon impregnated with the preparation. Semi-solid ear preparation can be ointments, cream, and gels. They are supplied in containers fitted with a suitable applicator.

Ear powders

Ear powders are intended for application or insufflation to the external auditory meatus. They are supplied in containers fitted with a suitable device for application or insufflation.

Ear washes

Ear washes are preparations intended to cleanse the external auditory meatus. They are usually aqueous solutions with a pH within physiological limits. Ear washes are really important steps to clean the ear canal before medication in small animals. They clean allergens, irritants, bacteria and viruses from the ear canal reducing the frequency of infection. Ear washes intended for application to injured parts or prior to surgical operation are sterile.

Ear tampons

Ear tampons are solid, single-dose preparations intended to be inserted into external auditory meatus. They are designed to be inserted into the ear canal for limited period of time. They comply with the requirements of medicated tampons.

3.4.4.(c) Nasal preparations

Nasal preparations are liquid, semi-solid or solid preparations intended for administration directly into the nasal cavity to obtain a local or systemic effect. They contain one or more active substances. This route of application is not common route in the animals generally. Typical examples in applications in humans are for local therapy decongestants and allergy treatment. Nasal preparations are as far as possible non-irritating and do not adversely affect the functions of the nasal mucosa and its cilia. These preparations need not be sterile.
Preparation sterility is required for surgery in this area and in case of application in the serious damage of nasal cavity.

Aqueous nasal preparations are usually isotonic and may contain excipients, for example, to adjust the viscosity of the preparations, to adjust or stabilise the pH, to increase the solubility of the active substance, or to stabilise the preparation.

Nasal preparations are supplied in multidose or single-dose containers, provided, if necessary, with suitable administration device, which may be designed to avoid the introduction of contaminants.

**Nasal drops and liquid nasal sprays**

Nasal drops and liquid nasal sprays are solutions, emulsions and suspensions intended for instillation or spraying into the nasal cavity. The drug may have a local effect, e.g. antihistamines, decongestants. Alternatively the drug may be absorbed through the nasal mucosa to exert a systemic effect. Correct officinal name for nasal drops is *Rhinoguttae*, we can use abbreviation *rhinogutt*, for prescribing in individually prepared preparations.

Emulsions may show evidence of phase separation but easily re-dispersed on shaking. Suspensions may show a sediment, which is readily dispersed on shaking to give a suspension that remains sufficiently stable to enable the correct dose to be delivered. Nasal drops are usually supplied in multidose containers provided with a suitable applicator. Liquid nasal sprays are supplied in containers with atomising devices or in pressurised containers fitted with a suitable adapter and with or without a metering dose valve. The size of droplets of the spray is such as to localise their deposition in the nasal cavity.

**Nasal powders**

Nasal powders are powders intended for insufflations into the nasal cavity by means of a suitable device. The size of particles is such as to localise their deposition in the nasal cavity.

**Semi-solid nasal preparations**

The containers are adapted to deliver the product to the site of application. Ointments, creams, and gels are typical.
Nasal washes

Nasal washes are generally aqueous isotonic solutions intended for cleansing and rinsing the nasal cavity. Nasal washes intended for application to injured parts or prior to a surgical operation are sterile. Nasal cleansing is an excellent way to clean mucus from the nose making medication more effective. They also clean allergens, irritants, bacteria and viruses from the nose cavity reducing the frequency of infection.

Nasal sticks

Nasal sticks are rod shaped or conical, solid preparations. They are intended for local application. They are dissolved or dispersed in a suitable basis which may dissolve or melt at body temperature.

3.4.4.(d) Rectal preparations

Rectal preparations are intended for rectal use in order to obtain a systemic or local effect, or they may be intended for diagnostic purposes. There are more advantages of rectal administration. First we can mention problem with oral administration of the drugs, for example drugs causing severe nausea, vomiting or possibility of the irritation to stomach. This route of administration is useful in paediatric, aggressive or unconscious patients.

Suppositories

Suppositories are solid, single-dose preparations. The shape (typical is conical-shaped), volume and consistency of suppositories are suitable for rectal administration. They are the most common dosage forms used for rectal drug administration. Correct officinal name for suppository is Suppositorium, we can use abbreviation supp. for prescribing in individually prepared preparations.

They contain one or more active substances dispersed or dissolved in a suitable basis (cocoa oil, neutral fat or suppository base) which melt at body temperature. Suppositories for veterinary use vary in shapes, sizes and weights. Excipients such as diluents, absorbents, surface-active agents, lubricants, antimicrobial preservatives and colouring matter, may be added if necessary.

Suppositories are prepared by compressing or moulding. If necessary, the active substance/s are previously ground and sieved through a suitable sieve. When prepared by moulding, the
medicated mass, sufficiently liquefied by heating, is poured into suitable moulds. The suppository solidifies on cooling.

**Rectal solutions and suspensions**

Rectal solutions, emulsions and suspensions are liquid preparations intended for rectal use in order to obtain a systemic or local effect, or they may be intended for diagnostic purposes. Rectal solutions, emulsions and suspensions are supplied in single-dose containers and contain one or more active substances dissolved or dispersed in water, glycerol or macrogols or other suitable solvents. Emulsions may show evidence of phase separation but are readily re-dispersed on shaking. Suspensions may show a sediment, which is readily dispersed on shaking to give a suspension that remains sufficiently stable to enable the correct dose to be delivered.

Rectal solutions, emulsions and suspensions may contain excipients, for example to adjust the viscosity of the preparation, to adjust or stabilise the pH, to increase the solubility of the active substance/s or to stabilise the preparation. These substances do not adversely affect the intended medical action or, at the concentrations used, cause undue local irritation.

Rectal solutions, emulsions and suspensions are supplied in containers containing a volume in the range of 2.5 ml to 2000 ml. The container is adapted to deliver the preparation to the rectum or is accompanied by a suitable applicator.

**Powders and tablets for rectal solutions and suspensions**

Powders and tablets intended for the preparation of rectal solutions or suspensions are single-dose preparations that are dissolved or dispersed in water or other suitable solvents at the time of administration. After dissolution or suspensions, they comply with the requirements for rectal solutions or rectal emulsions.

**Semi-solid rectal preparations**

Semi-solid rectal preparations are ointments, creams or gels. They are often supplied as single-dose preparations in containers provided with a suitable applicator. These preparations are used for topical application to the perianal area. They are largely used to treat local conditions of anorectal pruritis, inflammation and the pain and discomfort. The drugs can include adstringents, protectants and lubricants, local anaesthetics, and antipruritic and anti-
inflammatory agents. Before applying semi-solid rectal preparations the perianal skin and the affected area should be cleaned and dried. There are preparations with special types of applicators, perforated applicator tips and inserters.

**Rectal foams**

Rectal foams comply with the requirements of the monograph Medicated foams.

**Rectal tampons**

Rectal tampons are solid, single-dose preparations intended to be inserted into the lower part of the rectum for a limited time.

**3.4.4.(e) Vaginal preparations**

Vaginal preparations are liquid, semi-solid or solid preparations intended for administration to the vagina usually in order to obtain a local effect. They contain one or more active substances in a suitable basis.

**Pessaries, vaginal globules**

Pessaries are solid, single-dose preparations. They have various shapes, usually ovoid, with a volume and consistency suitable for insertion into the vagina where they melt or dissolve. They contain one or more active substances dispersed or dissolved in a suitable basis that may be soluble or dispersed in water or may melt at body temperature.

**Vaginal tablets**

Vaginal tablets are solid, single-dose preparations. They generally conform to the definitions of uncoated or film-coated tablets given in the monographs Tablets, *Compressi*.

**Vaginal capsules**

Vaginal capsules (shell pessaries) are solid, single-dose preparations. They are generally similar to soft capsules as defined in the monograph Capsules, differing only in their shape and size. Vaginal capsules have various shapes, usually ovoid. They are smooth and have a uniform external appearance.
**Vaginal solutions, emulsions and suspensions**

Vaginal solutions, emulsions and suspensions are liquid preparations intended for a local effect, for irrigation or for diagnostic purposes. They may contain excipients, for example to adjust the viscosity of the preparation, to adjust or stabilise the pH, to increase the solubility of the active substance/s or to stabilise the preparation. The excipients do not adversely affect the intended medical action or, at the concentrations used, cause undue local irritation. Vaginal emulsions may show evidence of phase separation but readily re-dispersed on shaking. Vaginal suspensions may show sediment that is readily dispersed on shaking to give a suspension that remains sufficiently stable to enable a homogeneous preparation to be delivered. They are supplied in single-dose containers. The container is adapted to deliver the preparation to the vagina or it is accompanied by a suitable applicator.

**Tablets for vaginal solutions and suspensions**

Tablets intended for the preparation of vaginal solutions and suspensions are single-dose preparations that are dissolved or dispersed in water at the time of administration. They may contain excipients to facilitate dissolution or dispersion or to prevent caking. After dissolution or dispersion, they comply with the requirements for vaginal solutions or vaginal suspensions.

**Semi-solid vaginal preparations**

Semi-solid vaginal preparations are ointments, creams and gels. They are often supplied in single-dose containers. The container is provided with a suitable applicator. Semi-solid vaginal preparations comply with requirements of the monograph Semi-solid preparations for cutaneous application.

**Vaginal foams**

Vaginal foams comply with requirements of the monograph Medicated foams.

**Medicated vaginal tampons**

Medicated vaginal tampons are solid, single-dose preparations intended to be inserted in the vagina for a limited time. They comply with requirements of the monograph Medicated tampons.
3.4.4.(f) **Intrauterine preparations**

Intrauterine preparations for veterinary use are liquid, semi-solid or solid preparations intended for the direct administration to the uterus (cervix, cavity or fundus), usually in order to obtain a local effect. They contain one or more active substances in a suitable basis.

**Intrauterine tablets**

Intrauterine tablets are solid preparations containing single dose of active substance/s. They generally conform to the definition given in the monograph on Tablets. A suitable applicator may be used for application into the uterus.

**Intrauterine capsules**

Intrauterine capsules are solid, single-dose preparations. They are generally similar to soft capsules, differing only in their shape and size. Intrauterine capsules have various shapes, usually ovoid. They are smooth and have a uniform external appearance. A suitable applicator may be used for application into the uterus.

**Intrauterine solutions, emulsions and suspensions, concentrates for intrauterine solutions**

Intrauterine solutions, emulsions and suspensions are liquid preparations. Concentrates for intrauterine solutions are intended for administration after dilution. They may contain excipients, for example to adjust the viscosity of the preparation, to adjust or stabilise the pH, to increase the solubility of the active substance/s or to stabilise the preparation. The excipients do not adversely affect the intended medical action or, at the concentrations used, cause undue local irritation. Intrauterine emulsions may show evidence of phase separation, but readily re-dispersed on shaking. Intrauterine suspensions may show sediment that is readily dispersed on shaking to give a suspension that remains sufficiently stable to enable a homogeneous preparation and dose to be delivered. They may be supplied in single-dose containers. The container is adapted to deliver the preparation to the uterus or it is accompanied by suitable applicator.
Tablets for intrauterine solutions and suspensions

Tablets intended for the preparation of intrauterine solutions and suspensions are single-dose preparations which are dissolved or dispersed in water at the time of administration. They may contain excipients to facilitate dissolution or dispersion or to prevent caking. Tablets for intrauterine solutions and suspensions confirm with the definition given in the monograph on Tablets. After dissolution or dispersion, they comply with the requirements for intrauterine solutions or intrauterine suspensions.

Semi-solid intrauterine preparations

Semi-solid intrauterine preparations are ointments, creams and gels. Semi-solid vaginal preparations comply with requirements of the monograph Semi-solid preparations for cutaneous application. They are often supplied in single-dose containers. The container is adapted to deliver the preparation to the uterus or may be accompanied by a suitable applicator.

Intrauterine foams

Intrauterine foams comply with the requirements of the monograph on Medicated foams. They are supplied in multidose containers. The container is adapted to deliver the preparation to the uterus or may be accompanied by a suitable applicator.

Intrauterine sticks

Intrauterine sticks comply with the requirements of the monograph on Sticks. They often produce foam when coming into contact with physiological fluids.

3.4.4.(g) Intramammary preparations

Intramammary preparations for veterinary use are sterile preparations intended for introduction into the mammary gland via the teat canal.

There are two main categories:

- Preparations intended for administration to lactating animals, and
- Preparations intended for administration to animals at the end of lactation or non-lactating animals for the treatment or prevention of infection.
Intramammary preparations for veterinary use are solutions, emulsions or suspensions or semi-solid preparations containing one or more active substances in a suitable vehicle. They may contain excipients such as stabilising, emulsifying, suspending and thickening agents. Suspensions may show a sediment which is readily dispersed on shaking. Emulsions may show evidence of phase separation but readily re-dispersed on shaking. Intramammary preparations for veterinary use are supplied in containers for use on one occasion only for introduction in a single teat canal of an animal. If supplied in multidose containers, aqueous preparations contain a suitable antimicrobial preservative at a suitable concentration, except where the preparation itself has adequate antimicrobial properties.

3.4.4.(h) Oromucosal preparations

Oromucosal preparations are solid, semi-solid or liquid preparations, containing one or more active substances intended for administration to the oral cavity and/or the throat to obtain a local or systemic effect. Preparations intended for local effect may be designed for application to a specific site within the oral cavity such as gums (gingival preparations) or the throat (oropharyngeal preparations). Preparations intended for a systemic effect are designed to be absorbed primarily at one or more sites on the oral mucosa (e.g. sublingual preparations). Mucoadhesive preparations are intended to be retained in the oral cavity by adhesion to the mucosal epithelium and may modify systemic drug absorption at the site of application. For many oromucosal preparations, it is likely that some proportion of the active substance/s will be swallowed and may be absorbed via the gastrointestinal tract. In consideration of these facts and route and type of administration, these preparations are not typical for use in veterinary practice.

Gingival solutions

Gingival solutions are intended for administration to the gingivae by means of a suitable applicator.

Oromucosal solutions and oromucosal suspensions

Oromucosal solutions and oromucosal suspensions are liquid preparations intended for administration to the oral cavity by means of a suitable applicator. Oromucosal suspensions may show sediment which is readily dispersible on shaking to give a suspension.
Semi-solid oromucosal preparations

Semi-solid oromucosal preparations are hydrophilic gels or pastes intended for administration to the oral cavity or to a specific part of the oral cavity such as the gingivae (gingival gel, gingival paste). They may be provided as single-dose preparations.

Oromucosal drops, oromucosal sprays and sublingual sprays

Oromucosal drops, oromucosal sprays and sublingual sprays are solutions, emulsions or suspensions intended for local or systemic effect. They are applied by instillation or spraying into the oral cavity or onto a specific part of oral cavity such a spraying under the tongue (sublingual spray) or into the throat (oropharyngeal spray). Emulsions may show evidence of phase separation but readily re-dispersed on shaking. Suspensions may show sediment that is readily dispersed on shaking to give a suspension that remains sufficiently stable to enable the correct dose to be delivered. The size of the droplets of the sprays is such as to localize their deposition in the oral cavity or the throat as intended.

Lozenges and pastilles

Lozenges and pastilles are solid, single-dose preparations intended to be sucked to obtain, usually, a local effect in the oral cavity and the throat. They contain one or more active substances, usually in a flavoured and sweetened base, and are intended to dissolve or disintegrate slowly in the mouth when sucked. Lozenges are hard preparations prepared by moulding. Pastilles are soft, flexible preparations prepared by moulding of mixtures containing natural or synthetic polymers or gums and sweeteners.

Compressed lozenges

Compressed lozenges are solid, single-dose preparations intended to be sucked to obtain a local or systemic effect. They are prepared by compression and are often rhomboid in shape. Compressed lozenges conform to the general definition of tablets.

Sublingual tablets and buccal tablets

Sublingual tablets and buccal tablets are solid, single-dose preparations to be applied under the tongue or to the buccal cavity, respectively, to obtain a systemic effect. They are prepared
by compression of mixture of powder or granulations into tablets with a shape suited for intended use. Sublingual tablets and buccal tablets conform to the general definition of tablets.

**Oromucosal capsules**

Oromucosal capsules are soft capsules to be chewed or sucked.

**Mucoadhesive preparations**

Mucoadhesive preparations contain one or more active substances intended for systemic absorption through the buccal mucosa over a prolonged period time. They may be supplied as mucoadhesive buccal tablets, as buccal films or as other mucoadhesive solid or semi-solid preparations. They usually contain hydrophilic polymers, which on wetting with saliva produce a hydrogel that adheres to the buccal mucosa. Mucoadhesive buccal tablets are prepared by compression and may be single- or multilayer tablets. Buccal films are single- or multilayer sheets of suitable materials.

**Orodispersible films**

Orodispersible films are single- or multilayer sheets of suitable materials, to be placed in the mouth where they disperse rapidly.

**3.4.5. Drug dosage forms for inhalation**

Inhalation is a way of administration of the drugs by the absorption from the airways and alveoli. We can expect local or systemic effect – absorption from airways into the pulmonary circulation. Drugs in the gaseous state readily reach the alveolar surfaces, whereas only particles < 2 µm are transported into terminal passages of the airways (ducts and alveoli). Particles < 5 µm may reach the respiratory bronchioles and particles in range 5 – 10 µm stay in the upper respiratory parts and larger airways. This route of administration is used for general anaesthetics, expectorants, bronchodilators.

**Preparations for inhalation**

Preparations for inhalation are liquid or solid preparations intended for administration as vapours or aerosols to the lung in order to obtain a local or systemic effect. They contain one
or more active substance/s which may be dissolved or dispersed in a suitable vehicle. Preparations for inhalation may, depending on the type of preparation, contain propellants, cosolvents, diluents, antimicrobial preservatives, solubilising and stabilising agents, etc. These excipients do not adversely affect the functions of the mucosa of respiratory tract or its cilia. They are supplied in multidose or single-dose containers.

**Liquid preparations for inhalation**

We have three categories of these preparations:

- Preparations intended to be converted into vapour,
- Liquid preparations for nebulisation,
- Pressurised metered-dose preparations for inhalation.

Liquid preparations for inhalation are solutions or dispersions. Dispersions are readily dispersible on shaking and they remain sufficiently stable to enable the correct dose to be delivered.

*Preparations intended to be converted into vapour*

Preparations intended to be converted into vapour are solutions, dispersions or solid preparations. They are usually added to hot water and the vapour generated is inhaled.

*Liquid preparations for nebulisation*

Liquid preparations for inhalation intended to be converted into aerosols by continuously operating nebulisers or metered-dose nebulisers are solutions, suspensions or emulsions. Suitable cosolvents or solubilisers may be used to increase the solubility of the active substances. Liquid preparations for nebulisation in concentrated form for use in continuously operating nebulisers are diluted to the prescribed volume with the prescribed liquid before use. Liquids for nebulisation may also be prepared from powders. Continuously operating nebulisers are devices that convert liquids into aerosols by high-pressure gases, ultrasonic vibration and other methods. They allow the dose to be inhaled at an appropriate rate and particle size which ensures deposition of the preparation in the lungs. Metered-dose nebulisers as previous are devices that convert liquids into aerosols by high-pressure gases, ultrasonic vibration and other methods. The volume of liquid to be nebulised is metered so that the aerosol dose can be inhaled with one breath.
Pressurised metered-dose preparations for inhalation

Pressurised metered-dose preparations for inhalation are solutions, suspensions or emulsions supplied in container equipped with a metering valve and which are held under pressure with a suitable propellants or suitable mixtures of liquefied propellants, which can act also as solvents. The delivered dose is the dose delivered from the inhaler to patient. For some preparations, the dose has been established as a metered dose. The metered dose is determinated by adding the amount deposited on the inhaler to the delivered dose. It may also be determinated directly.

Powders for inhalation

Powders for inhalation are presented as single-dose or multidose powders. To facilitate their use, active substance can be combined with a suitable carrier. They are generally administered by powder inhalers.

3.4.6. Transdermal dosage forms (administered on the skin with systemic effect)

An important function of the skin is to protect the body from external environment, and it is normally a very effective barrier to the permeation of drug substances. However, for certain drug substances, depending on their physicochemical properties by means of passive diffusion is possible to achieve a therapeutic effect. Otherwise, this may be achieved by chemical permeation enhancement, which involves the manipulation of the formulation by either:

- increasing the thermodynamic activity of the drug substance in formulation (e.g. by supersaturation)
- chemical enhancement (e.g. solvents can act as a carrier of the active, skin penetration enhancers).

Transdermal drug delivery is a non-invasive delivery of medications from the surface of skin, through its layers, to the circulatory system. TDDS (Transdermal Drug Delivery system) offers many advantages over conventional methods. It reduces the load that the oral route commonly places on the digestive tract and liver. It enhances patient compliance and minimizes harmful side effects of a drug caused from temporary overdose. Another advantage is convenience, especially notable in patches that require only once application or application in longer intervals.
Transdermal patches

These drug dosage forms are flexible, multi-laminated, pharmaceutical preparation of varying sizes, containing one or more active substances. This is normally formulated with pressure-sensitive adhesives that assure the adhesion of the preparation to the skin. They are intended to be applied on intact (non-injured) skin in order to deliver the active substance/s to the systemic circulation. Recently, transdermal patches have been considered as an alternative method of drug application in animals. One of the advantages of transdermal patches is that they can minimise the risk of adverse effects of the drug by decreasing large fluctuations in plasma concentration.

Transdermal patches are designed to slowly deliver the drug substance/s through the intact skin, resulting in a prolonged and adequately constant systemic absorption rate. The rate limiting step for systemic absorption of the drug substance is usually the absorption through the skin. Absorption may also be limited by incorporating or dissolving the drug substance in a (semi-solid) reservoir, with a membrane to control the release and the diffusion of the drug substance/s from the patch. The transdermal patch can also be formulated combining both drug delivery principles as the means of controlling drug delivery to the surface of the skin.

When applied to the dried, clean and non-injured skin, the transdermal patches adheres firmly to the skin by gentle pressure of the hand or the fingers and can be peeled off without causing skin injury or detachment of the preparation from the outer covering. The patch must not be irritant or sensitising to the skin, even after repeated applications. Transdermal patches are normally individually enclosed in the sealed sachets.
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SÚKL: http://www.sukl.eu/pharmaceutical-industry/informace-o-historii-a-soucasnosti-ceskeho-lekopisu


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