Solutions

Exercise 2

Ben Holioake	Dr A Beattie
25 Browns Ave	45 Carrick Drive
Greenvale	Tullamarine
	(12/03/2025)
Rx Calamine Lotion APF 23	
Mitte 100 mL	
Sig: Apply to rash prn	A. Beattie

Patient info: *Ben is an adult male who has a very itchy rash on his body.*

Examining the Prescription/Batch Records

- Name: of the product. If it's APF then also record which APF.
- Date of manufacture: Today. Date cannot be backdated.
- Product: Type of the product (ointment? cream?)
- Indication for use: Check prescription
- Source of formula: APF, AMH, Martindale ...
- Dosage check: especially needed if child

Batch

- Product name: same as the proforma
- Batch number is not applicable since we're making it for one person
- Ingredients: list all
- Use: what role does each ingredient play
- Formula: weight exactly written on your APF
- QD: quantity dispensed, how much you actually make
- Container: Light-resistant? air-tight? Clear?

Others

- Remember that you're counselling on the product AND active ingredient

Solution

Prescription Record

Date	Patient Name	Address	Prescription	Batch No.	Prescriber	Presc. No.	Dispenser
12/03/2025	Ben Holioake	25 Browns Ave, Greenvale	Calamine Lotion APF 23 (100 mL)	N/A	A Beattie	SHP010715-3	SH

Expiry: 28 days

Ingredient	Quantity	Purpose
Calamine	15 g	Anti-pruritic
ZnO	5 g	Skin protectant
Bentonite	3 g	Susp. agent
Na citrate	0.5 g	Preservative
Liquefied phenol	0.5 mL	Preservative
Glycerol	5 mL	Emollient
Water	to 100 mL	Vehicle/Diluent

Exercise 3: Osmolarity (Ratios of ions upon dissociation)

Moles of $MgCl_2 \cdot 6H_2O$:

$$n(MgCl_2 \cdot 6H_2O) = \frac{3.7g}{203.3g\,mol^{-1}} \approx 0.0182mol$$

Since $MgCl_2$ dissociates as follows:

$$MgCl_2 \longrightarrow Mg^{2+} + 2\,Cl^-$$

Then,

$$Osm(MgCl_2 \cdot 6H_2O) = 0.0182mol \times 3 \approx 0.0546\ osmol$$

For KCl:

$$n(\mathrm{KCl}) = \frac{3.0\mathrm{g}}{74.6\,\mathrm{g\,mol^{-1}}} \approx 0.0402\mathrm{mol}$$

We know $\mathrm{KCl} \to \mathrm{K^+} + \mathrm{Cl^-}$, so:

$$\mathrm{Osm(KCl)} = 0.0402\mathrm{mol} \times 2 \approx 0.0804\ \mathrm{osmol}$$

In total,

$$\begin{aligned}\sum \mathrm{Osm} &:= \mathrm{Osm(MgCl_2 \cdot 6H_2O)} + \mathrm{Osm(KCl)} \\ &= 0.0546\ \mathrm{osmol} + 0.0804\ \mathrm{osmol} \\ &= 0.1349\ \mathrm{osmol} \implies 135\ \mathrm{mOsm}\end{aligned}$$

Exercise 4: Osmolarity

1. m of each salt:

$$m(\mathrm{KH_2PO_4}) = 0.908\mathrm{g\ in\ 100mL}$$
$$= 0.454\mathrm{g\ in\ 50\ mL}$$
$$m(\mathrm{Na_2HPO_4 \cdot 12H_2O}) = 2.39\mathrm{g\ in\ 100mL}$$
$$= 1.195\mathrm{g\ in\ 50\ mL}$$

2. Moles of each salt:

$$n(\mathrm{KH_2PO_4}) = \frac{0.454\mathrm{g}}{136\mathrm{g\,mol^{-1}}} \approx 0.0033\mathrm{mol}$$

$\mathrm{KH_2PO_4} \rightarrow \mathrm{K^+} + \mathrm{H_2PO_4^-}$, so:

$$\mathrm{Osm(KH_2PO_4)} = 0.0033\mathrm{mol} \times 2 \approx 0.0066\ \mathrm{osmol}$$

$$n(\mathrm{Na_2HPO_4 \cdot 12H_2O}) = \frac{1.195\mathrm{g}}{358\mathrm{g\,mol^{-1}}} \approx 0.0033\mathrm{mol}$$

$\mathrm{Na_2HPO_4 \cdot 12H_2O \rightarrow 2Na^+ + HPO_4^{2-}}$, so:

$$\mathrm{Osm(Na_2HPO_4 \cdot 12H_2O)} = 0.0033\mathrm{mol} \times 3 \approx 0.0099\ \mathrm{osmol}$$

In total,

$$\begin{aligned} \sum \mathrm{Osm} &:= \mathrm{Osm(KH_2PO_4)} + \mathrm{Osm(Na_2HPO_4 \cdot 12H_2O)} \\ &= 0.0066\ \mathrm{osmol} + 0.0099\ \mathrm{osmol} \\ &= 0.0165\ \mathrm{osmol} \implies 17\ \mathrm{mOsm} \end{aligned}$$

Exercise 5: Equivalents (Charge of ion)

200 mL of soln, 5 mEq of Ca^{2+} per 5mL is equivalent to:

$$\frac{5\ \mathrm{mEq}}{5\ \mathrm{mL}} = 1\ \mathrm{mEq/mL}$$

Thus, the total mEq in 200 mL is:

$$\begin{aligned} \mathrm{mEq}_{\mathrm{total}} &= 1\ \mathrm{mEq/mL} \times 200\ \mathrm{mL} \\ &= 200\ \mathrm{mEq} \implies 0.200\ \mathrm{Eq} \end{aligned}$$

Ca^{2+} has a valency of 2, so:

$$n(Ca^{2+}) = \frac{0.200 \text{ Eq}}{2\text{Eq}\,\text{mol}^{-1}} = 0.100 \text{ mol}$$

Because we have the hydrated salt, whihc dissociates as follows:

$$CaCl_2 \cdot 2H_2O \rightarrow Ca^{2+} + 2Cl^- + 2H_2O$$

Each mole of $CaCl_2 \cdot 2H_2O$ gives 1 mole of Ca^{2+},

so $n(Ca^{2+}) \equiv n(CaCl_2 \cdot 2H_2O)$.

Knowing we need 0.100 mol of $\mathrm{CaCl_2 \cdot 2H_2O}$, and its MW is 147 g/mol, we can calculate the mass:

$$\begin{aligned} m(\mathrm{CaCl_2 \cdot 2H_2O}) &:= n(\mathrm{CaCl_2 \cdot 2H_2O}) \times MW(\mathrm{CaCl_2 \cdot 2H_2O}) \\ &= 0.100\ \mathrm{mol} \times 147\mathrm{g\,mol}^{-1} \\ &\approx 14.7\ \mathrm{g} \end{aligned}$$