Revision

Standard 2 2019 Q28

The formula below is used to calculate an estimate for blood alcohol content (BAC) for females.

$$BAC_{\text{Female}} = \frac{10N - 7.5H}{5.5M}$$

The number of hours required for a person to reach zero BAC after they stop consuming alcohol is given by the following formula:

$$\text{Time} = \frac{BAC}{0.015}$$

A class of wine contains 1.2 standard drinks, and a glass of spirits contains 1 standard drink.

Hanna weighs 60 kg. She consumed 3 glasses of wine and 4 glasses of spirits between 6:15 pm and 12:30 am the following day. She then stopped drinking alcohol.

Using the given formulae, calculate the time in the morning when Hannah's BAC should reach zero.

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Solution

6:23 am

Medication

Standard

MS-A1 Formulae and Equations

updated: 2021-01-26

Learning Outcome

Topic:

Medication

Syllabus:

- calculate required medication dosages for children and adults from packets, given age or weight, using Fried's, Young's or Clark's formula as appropriate
  - Fried's formula: Dosage for children 1-2 years $= \frac{\text{age (in months)} \times \text{adult dosage}}{150}$
  - Young's formula: Dosage for children 1-12 years $= \frac{\text{age of child (in years)} \times \text{adult dosage}}{\text{age of child (in years)} + 150}$
  - Clark's formula: Dosage $= \frac{\text{weight in kg} \times \text{adult dosage}}{70}$

Activities/Tasks:

- Cambridge Ex 3G Q1-11

Converting concentrations

A concentration is a rate comparing a mass (g, mg, etc.) with a volume (L, mL, etc.). We need to consider both when converting a concentration from one unit to another.

Example 1

The concentration of a mild analgesic is given as 80 mg per 50 mL. What is in g/mL?

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$$\begin{aligned} 80 \text{ mg}/50 \text{ mL} &= \frac{80 \text{ mg}}{50 \text{ mL}} \\ &= 1.6 \text{ mg/mL} \end{aligned}$$

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$$\begin{aligned} 80 \text{ mg}/50 \text{ mL} &= \frac{80 \text{ mg}}{50 \text{ mL}} \\ &= 1.6 \text{ mg/mL} \\ &= 1.6 \div 1000 \text{ g/mL} \end{aligned}$$

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Solution

$$\begin{aligned} 80 \text{ mg}/50 \text{ mL} &= \frac{80 \text{ mg}}{50 \text{ mL}} \\ &= 1.6 \text{ mg/mL} \\ &= 1.6 \div 1000 \text{ g/mL} \\ &= 0.0016 \text{ g/mL} \end{aligned}$$

Calculating dosages

Often when calculating dosages you will be prescribed an amount in milligrams (mg) and need to calculate how much of a liquid that need to be taken. In these cases you can use the following:

Formula

$$\text{volume required} = \frac{\text{strength required}}{\text{strength of stock}} \times \text{volume of stock}$$

Where your *stock* is the medication you're given.

> **Important Note**
> This formula is **not** on the reference sheet.

Example 2

A patient is prescribed 1000 mg of a mild painkiller. The medication available contains 100 mg in 5 mL. How much medication should be given to the patient?

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$$\begin{aligned}\text{volume required} &= \frac{\text{strength required}}{\text{strength of stock}} \times \text{volume of stock} \\ &= \frac{(1000\text{ mg})}{(100\text{ mg})} \times (5\text{ mL}) \\ &= 50\text{ mL}\end{aligned}$$

Children and infants

There are three formulae used for children and infants:

Formula

- Fried's formula: Dosage for children 1-2 years $= \dfrac{\text{age (months)} \times \text{adult dosage}}{150}$
- Young's formula: Dosage for children 1-12 years $= \dfrac{\text{age of child (years)} \times \text{adult dosage}}{\text{age of child (years)} + 150}$
- Clark's formula: Dosage $= \dfrac{\text{weight (kg)} \times \text{adult dosage}}{70}$

Important Note

These formulae are **not** on the reference sheet.

You are **not** expected to remember these formulae.

Example 3

Jessica is 6 months old. Use Fried's formula to find the required infant dose if the adult dost is 20 mL.

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Solution

$$\begin{aligned}\text{Dosage} &= \frac{\text{age (months)} \times \text{adult dosage}}{150} \\ &= \frac{(6) \times (20)}{(150)}\end{aligned}$$

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$$\text{Dosage} = \frac{\text{age (months)} \times \text{adult dosage}}{150}$$

Solution

$$\begin{aligned}\text{Dosage} &= \frac{\text{age (months)} \times \text{adult dosage}}{150} \\ &= \frac{(6) \times (20)}{(150)} \\ &= \frac{120}{150}\end{aligned}$$

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$$\text{Dosage} = \frac{\text{age (months)} \times \text{adult dosage}}{150}$$

Solution

$$\begin{aligned}
\text{Dosage} &= \frac{\text{age (months)} \times \text{adult dosage}}{150} \\
&= \frac{(6) \times (20)}{(150)} \\
&= \frac{120}{150} \\
&= 0.8 \text{ mL}
\end{aligned}$$

Today’s work

- Cambridge Ex 3G Q1-11