

# Deacon's Challenge

## No 137 - Answer

*What volume of 25% (w/w) hydrochloric acid (SG = 1.15 g/mL) would be required to prepare 3 L of 0.5 M hydrochloric acid?*

First calculate weight of pure HCl required to prepare 3 L of 0.5 M HCl:

$$\text{MW HCl} = 1 + 35.5 = 36.5$$

Therefore 1 M HCl contains 36.5 g/L

and 0.5 M HCl contains  $36.5/2 = 18.25$  g/L

and 3 L 0.5 M HCl contains  $18.25 \times 3 = 54.75$  g

Next calculate the weight of 25% (w/w) HCl which contains 54.75 g HCl:

Each g of 25% (w/w) contains 0.25 g HCl

Therefore 54.75 g is contained in  $54.75/0.25 = 219$  g 25% (w/w) HCl

Finally calculate the volume of 219 g of 25% (w/w) HCl:

$$\text{Density (g/mL)} = \frac{\text{Weight (g)}}{\text{Volume (mL)}}$$

Substitute density = 1.15 g/mL and weight = 219 g then solve for volume

$$1.15 = \frac{219}{\text{Volume (mL)}}$$

$$\text{Volume} = \frac{219}{1.15} = 190 \text{ mL (to 3 sig figs)}$$

## Question 138

The following results were obtained on a neonate weighing 1.06 Kg:

$$\text{pH} = 7.143$$

$$\text{pCO}_2 = 5.02 \text{ kPa}$$

The consultant gives the child a 6 mL bolus of sodium hydrogen carbonate 4.2%. The child is ventilated and no changes are made to the ventilator settings. Calculate the anticipated change in pH.

Assume that body water in infancy is 80% of body mass, evenly distributed between intra- and extra-cellular compartments.

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