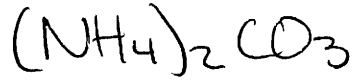


Exercises

1. We will use ammonium carbonate to answer the following questions.

a) What is the chemical formula for ammonium carbonate?



b) What is the molar mass of ammonium carbonate?

$$2N + 8H + C + 3O \quad 96.11 \text{ g/mol}$$

c) What is the mass of 0.950 mol of ammonium carbonate?

$$\frac{0.950 \text{ mol } (NH_4)_2CO_3}{1 \text{ mol } (NH_4)_2CO_3} \times 96.11 \text{ g} = 91.3 \text{ g } (NH_4)_2CO_3$$

d) How many moles of ammonium carbonate are present in 0.475 g?

$$\frac{0.475 \text{ g } (NH_4)_2CO_3}{96.11 \text{ g } (NH_4)_2CO_3} \times 1 \text{ mol} = 0.00494 \text{ mol } (NH_4)_2CO_3 \text{ or } 4.94 \times 10^{-3} \text{ mol}$$

e) How many carbonate ions are present in 0.25 moles of ammonium carbonate?

$$\frac{0.25 \text{ mol } (NH_4)_2CO_3}{1 \text{ mol } (NH_4)_2CO_3} \times \frac{1 \text{ mol } CO_3^{2-}}{1 \text{ mol } (NH_4)_2CO_3} \times 6.02 \times 10^{23} = 1.5 \times 10^{23} \text{ } CO_3^{2-} \text{ ions}$$

f) How many ammonium ions are present in 0.25 moles of ammonium carbonate?

$$\frac{0.25 \text{ mol } (NH_4)_2CO_3}{1 \text{ mol } (NH_4)_2CO_3} \times 2 \text{ mol } NH_4^+ = 3.0 \times 10^{23} \text{ } NH_4^+ \text{ ions}$$

g) How many ammonium ions are present in 2.30 g of ammonium carbonate?

$$\frac{2.30 \text{ g } (NH_4)_2CO_3}{96.11 \text{ g}} \times \frac{1 \text{ mol } (NH_4)_2CO_3}{1 \text{ mol } (NH_4)_2CO_3} \times 2 \text{ mol } NH_4^+ = 0.048 \text{ mol } NH_4^+$$

2. We have a 25 g sample of potassium chloride and a 25 g sample of magnesium chloride.

Which sample contains the most chloride ions?

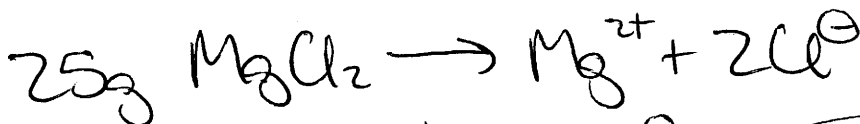
show calc to support answer

MgCl₂

$$KCl = 74.55 \frac{\text{g}}{\text{mol}}$$



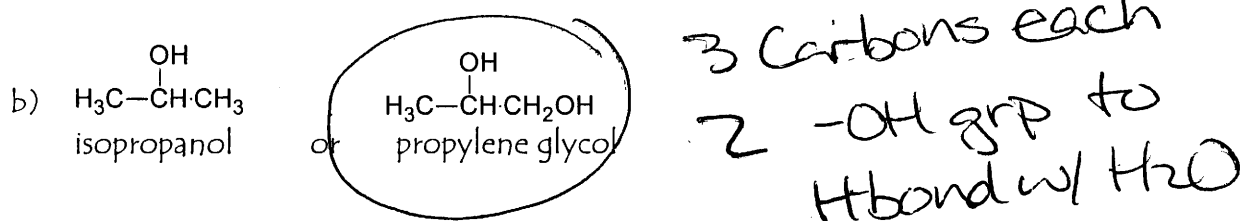
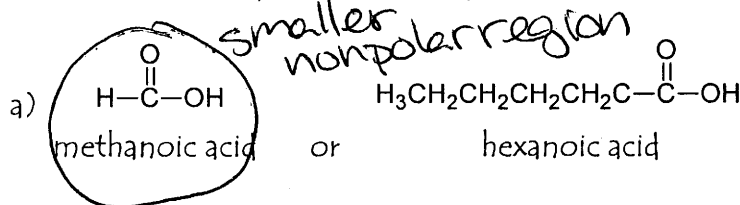
$$\frac{25 \text{ g } KCl}{74.55 \text{ g}} \times \frac{1 \text{ mol } KCl}{1 \text{ mol } KCl} \times \frac{1 \text{ mol } Cl^-}{1 \text{ mol } KCl} = 0.34 \text{ mol } Cl^-$$



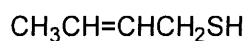
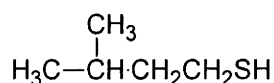
$$MgCl_2 = 95.21 \frac{\text{g}}{\text{mol}}$$

$$\frac{25 \text{ g } MgCl_2}{95.21 \text{ g}} \times \frac{1 \text{ mol } MgCl_2}{1 \text{ mol } MgCl_2} \times \frac{2 \text{ mol } Cl^-}{1 \text{ mol } MgCl_2} = 0.53 \text{ mol } Cl^-$$

3. Which of the compounds in each pair is more water soluble? Explain your reasoning.

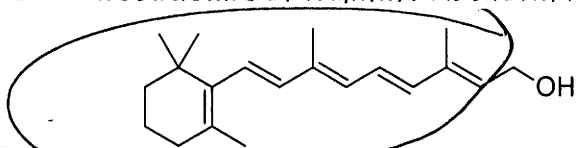


4. Skunk spray contains the two molecules below. Based on the structures, explain why skunk spray is hard to rinse off with water alone.



Both cpd are have low polarity so they do not interact w/ H₂O.

5. The structure of vitamin A is shown below. Vitamin A is not water soluble. Explain why.



Large non-polar region

5. Why is chloramphenicol palmitate less water soluble than chloramphenicol?

