

Solutions to Proportional Reasoning Problems

1. Using method 1: solving a proportion equation

Step 1: $55.85 \text{ g}/1 \text{ mol} = 136.9 \text{ g}/? \text{ mol}$. Let x be the number of moles that we are looking for. Hence we need to solve for x :

$$\frac{55.85 \text{ g}}{1 \text{ mol}} = \frac{136.9 \text{ g}}{x}$$

Step 2: Now we can solve for x by cross multiplying:

$$55.85 \text{ g} \times x = 136.9 \text{ g} \times 1 \text{ mol}$$

Step 3: Solve the equation for x , where x is the number of moles of atoms we are looking for:

$$\begin{aligned} x &= \frac{136.9 \text{ g} \times 1 \text{ mol}}{55.85 \text{ g}} \\ &= 2.451 \text{ mol} \end{aligned}$$

Therefore, about 2.452 moles of atoms are contained in 136.9 g of Fe

2. Using method 2: Solving how many grams of Na and Cl are in each gram of pure NaCl

Step 1: 100 grams of NaCl contains 39.4 grams of Na 100 grams of NaCl contains 60.6 grams of Cl

Step 2: To determine how many grams of Na and how many grams of Cl are present in 1 gram of NaCl we divide by 100 which gives:

$$\begin{aligned} 1 \text{ gram of NaCl contains } 0.394 \text{ grams of Na} \\ 1 \text{ gram of NaCl contains } 0.606 \text{ grams of Cl} \end{aligned}$$

Step 3: To now determine how many grams of Na and Cl are present in 250 g of pure NaCl we multiply by 250. That is:

$$\begin{aligned} 250 \text{ grams of NaCl contains } 250 \times 0.394 \text{ grams of Na} \\ 250 \text{ grams of NaCl contains } 250 \times 0.606 \text{ grams of Cl} \end{aligned}$$

Therefore, there are 98.5 grams of Na and 151.5 grams of Cl in 250 grams of pure NaCl.

3. **Using method 1: solving a proportion equation**

Step 1: $2050 \text{ km}/55 \text{ L} = x/22 \text{ L}$ where x is the number of kilometres.

We now need to solve for x

$$\frac{2050 \text{ km}}{55 \text{ L}} = \frac{x}{22 \text{ L}}$$

Step 2: Now, we can solve for x by cross multiplying:

$$2050 \text{ km} \times 22 \text{ L} = x \times 55 \text{ L}$$

Step 3: Solve the equation for x , where x is the number of moles of atoms we are looking for:

$$\begin{aligned} x &= \frac{2050 \text{ km} \times 22 \text{ L}}{55 \text{ L}} \\ &= 820 \text{ km} \end{aligned}$$

Therefore, a car can travel 820 km on 22 L