91 / 100 46/50 + 45 / 50 = 90%

Key: A

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21. Aluminum reacts with copper(II) chloride according to the balanced equation:

$$2\,Al\,(s) + 3\,CuCl_2\,(aq) \rightarrow 2\,AlCl_3\,(aq) + 3\,Cu\,(s)$$

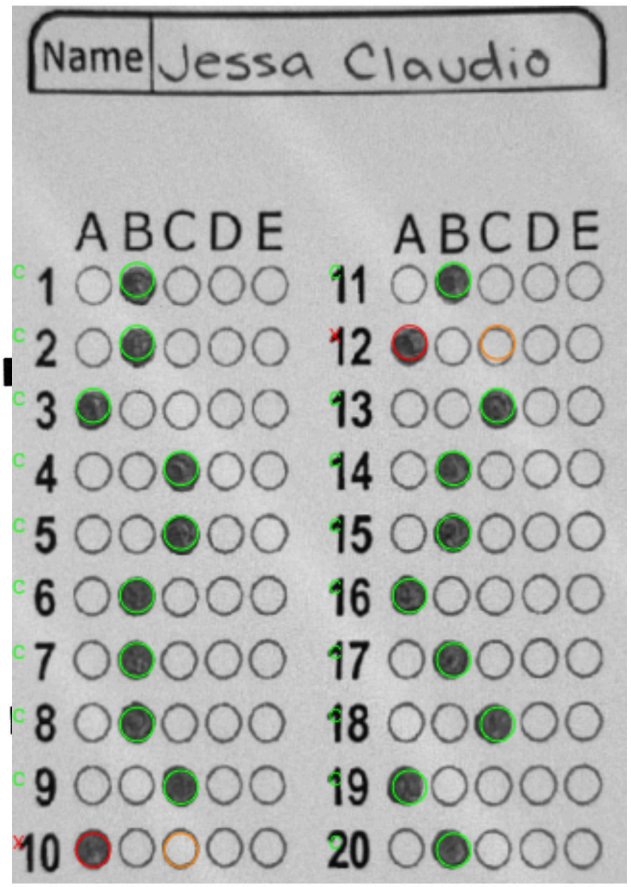
If 13.5 g of Al reacts with excess $CuCl_2$, how many grams of Cu will form?

g Al → mol Al → mol Cu → g Cu

$$13.5\,g \times \frac{1\,mol}{53.\cancel{X}16\,g} \times \frac{3}{2} \times \frac{63.546\,g}{1\,mol}$$

(-1)

$= 23.85\,g\,Cu$ ✓



22. You have 250. mL of 0.80 M NaCl solution. You dilute it with water to a total volume of 1.00 L. What is the new molarity of the solution?

1000 mL

$M_i V_i = M_f V_f$

$(0.80)(250\,mL) = (x)(1000\,mL)$

$M_f = 0.2\ M$ ✓

23. A solution is prepared by dissolving 8.50 g NaOH in enough water to make 200. g of total solution. The solution density is 1.05 g/mL. Calculate:

a) Molarity (M)

$M = \frac{mol}{L}$ $\quad 8.50g \cdot \frac{1mol}{40g} = 0.21$ $\quad M = \frac{0.21mol}{0.19L}$

$M = 1.11\,M$

$200g \times \frac{1mL}{1.05g} = 190.48mL \times \frac{1L}{1000mL} = 0.19L$

b) Molality (m)

$m = \frac{8.5g}{200g} = 0.0425\,m$

(-3)

c) Parts per million (ppm)

~~$\frac{8.5g}{200g} \times 100 \times 10^6 = 4.25 \times 10^6$~~

$\frac{8.5g}{200g} \times 10^4 = 4.25 \times 10^4$

24. What is the pH of a 0.025 M H_3O^+ solution?

$-(\log)[H_3O^+] = 1.60\ pH$

25. A weak acid has Ka = 1.8×10^{-5}.

a) Calculate its pKa.

$-(\log)[1.8 \times 10^{-5}] = 4.74$

b) Calculate the buffer pH range for this acid

4.74 ± 1 $\quad 3.74 - 5.74$