

Chemistry 20 – Lesson 16
Concentration

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1.
/2
$$c = \frac{v_{\text{solute}}}{v_{\text{solution}}} \times 100\%$$

$$v_{\text{solute}} = \frac{c}{100} \times v_{\text{solution}}$$

$$v_{\text{acetic acid}} = \frac{7}{100} \times 250\text{mL}$$

$$v_{\text{acetic acid}} = 17.5\text{mL}$$

2. 50 L of water = 50 kg

$$c = \frac{m_{\text{solute}}}{m_{\text{solution}}} \times 100\%$$

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$$m_{\text{solute}} = \frac{c}{100} \times m_{\text{solution}}$$

$$m_{\text{salt}} = \frac{25}{100} \times 50\text{kg}$$

$$m_{\text{salt}} = 12.5\text{kg}$$

3.
/2
$$m_{\text{solute}} = \frac{c}{10^6} \times m_{\text{solution}}$$

$$m_{\text{PCB}} = \frac{4.0}{10^6} \times 64\text{kg}$$

$$m_{\text{PCB}} = 0.256\text{g}$$

4.
/2
$$c = \frac{n}{v}$$

$$v = \frac{n}{c}$$

$$v = \frac{0.500\text{mol}}{1.24\text{ mol/L}}$$

$$v = 0.403\text{L}$$

5.
/2
$$c = \frac{m_{\text{solute}}}{m_{\text{solution}}} \times 10^6$$

$$c_{\text{F}^-} = \frac{0.750 \times 10^{-3}\text{g}}{600\text{g}} \times 10^6$$

$$c_{\text{F}^-} = 1.25\text{ppm}$$

6.
$$c = \frac{m_{\text{solute}}}{m_{\text{solution}}} \times 10^6$$

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$$c_{\text{SO}_2} = \frac{0.013\text{g}}{1500\text{g}} \times 10^6$$

$$c_{\text{SO}_2} = 8.67\text{ppm}$$

7.
$$c = \frac{m_{\text{solute}}}{m_{\text{solution}}} \times 10^6$$

/2
$$c_{\text{adenine}} = \frac{0.0050\text{g}}{500\text{g}} \times 10^6$$

$$c_{\text{adenine}} = 10\text{ppm}$$

8.
$$m_{\text{solute}} = \frac{c}{10^6} \times m_{\text{solution}}$$

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$$m_{\text{Na}^+} = \frac{34}{10^6} \times 300\text{g}$$

$$m_{\text{Na}^+} = 0.0102\text{g}$$

9.
$$c = \frac{n}{v}$$

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$$c = \frac{0.243\text{mol}}{0.250\text{L}}$$

$$v = 0.972\text{ mol/L}$$

10.
$$n = \frac{m}{M}$$

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$$n = \frac{3.05\text{g}}{40.00\text{ g/mol}}$$

$$n = 0.07625\text{mol}$$

$$c = \frac{n}{v}$$

$$c = \frac{0.07625\text{mol}}{0.0500\text{L}}$$

$$c = 1.53\text{ mol/L}$$

11.
$$n = \frac{m}{M}$$

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$$n = \frac{235\text{g}}{58.44\text{ g/mol}}$$

$$n = 4.02\text{mol}$$

$$c = \frac{n}{v}$$

$$c = \frac{4.02\text{mol}}{3.0\text{L}}$$

$$c = 1.3\text{ mol/L}$$

12.
$$n = \frac{m}{M}$$

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$$n = \frac{1.84\text{g}}{159.62\text{ g/mol}}$$

$$n = 0.0115\text{mol}$$

$$c = \frac{n}{v}$$

$$c = \frac{0.0115\text{mol}}{0.5000\text{L}}$$

$$c = 0.0231\text{ mol/L}$$

13.

$$n = \frac{m}{M}$$

$$c = \frac{n}{v}$$

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$$n = \frac{1.24\text{g}}{110.98 \frac{\text{g}}{\text{mol}}}$$

$$c = \frac{0.01117\text{mol}}{0.0250\text{L}}$$

$$n = 0.01117\text{mol}$$

$$c = 0.447 \frac{\text{mol}}{\text{L}}$$

14.

$$n = c v$$

$$m = n M$$

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$$n = 0.200 \frac{\text{mol}}{\text{L}} (0.500\text{L})$$

$$m = 0.100\text{mol} (120.07 \frac{\text{g}}{\text{mol}})$$

$$n = 0.100\text{mol}$$

$$m = 12.0\text{g}$$

15.

$$n = c v$$

$$m = n M$$

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$$n = 0.12 \frac{\text{mol}}{\text{L}} (0.200\text{L})$$

$$m = 0.024\text{mol} (163.94 \frac{\text{g}}{\text{mol}})$$

$$n = 0.024\text{mol}$$

$$m = 3.93\text{g}$$

16.

$$n = c v$$

$$m = n M$$

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$$n = 0.0017 \frac{\text{mol}}{\text{L}} (20\text{L})$$

$$m = 0.034\text{mol} (94.20 \frac{\text{g}}{\text{mol}})$$

$$n = 0.034\text{mol}$$

$$m = 3.20\text{g}$$

17.

$$n = c v$$

$$m = n M$$

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$$n = 0.055 \frac{\text{mol}}{\text{L}} (50.0\text{L})$$

$$m = 2.75\text{mol} (24.31 \frac{\text{g}}{\text{mol}})$$

$$n = 2.75\text{mol}$$

$$m = 66.9\text{g}$$

18.

$$n = c v$$

$$m = n M$$

/4

$$n = 0.0150 \frac{\text{mol}}{\text{L}} (45\text{L})$$

$$m = 0.675\text{mol} (40.08 \frac{\text{g}}{\text{mol}})$$

$$n = 0.675\text{mol}$$

$$m = 27.1\text{g}$$

19.

$$n = \frac{m}{M}$$

$$v = \frac{n}{c}$$

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$$n = \frac{250\text{g}}{98.09 \frac{\text{g}}{\text{mol}}}$$

$$v = \frac{2.549\text{mol}}{18.0 \frac{\text{mol}}{\text{L}}}$$

$$n = 2.549\text{mol}$$

$$v = 0.142\text{L}$$

20.

$$n = \frac{m}{M}$$

$$v = \frac{n}{c}$$

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$$n = \frac{59\text{g}}{40.00 \frac{\text{g}}{\text{mol}}}$$

$$v = \frac{1.475\text{mol}}{19.4 \frac{\text{mol}}{\text{L}}}$$

$$n = 1.475\text{mol}$$

$$v = 76.0\text{mL}$$

21.

$$n = \frac{m}{M}$$

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$$n = \frac{5.0\text{g}}{36.46 \frac{\text{g}}{\text{mol}}}$$

$$n = 0.137\text{mol}$$

$$v = \frac{n}{c}$$

$$v = \frac{0.137\text{mol}}{8.0 \times 10^{-2} \frac{\text{mol}}{\text{L}}}$$

$$v = 1.71\text{L}$$

22.

$$m_{\text{solute}} = \frac{c}{10^6} \times m_{\text{solution}}$$

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$$m_{\text{solution}} = \frac{m_{\text{solute}} \times 10^6}{c}$$

$$m_{\text{min water}} = \frac{1.0 \times 10^{-3} \times 10^6}{0.015}$$

$$m_{\text{min water}} = 6.67 \times 10^4 \text{g} = 66.7\text{kg}$$

23.

a)

$$n = \frac{m}{M}$$

$$v = \frac{n}{c}$$

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$$n = \frac{1.0\text{g}}{60.06 \frac{\text{g}}{\text{mol}}}$$

$$v = \frac{0.01665\text{mol}}{0.83 \frac{\text{mol}}{\text{L}}}$$

$$n = 0.01665\text{mol}$$

$$v = 0.0201\text{L}$$

b)

$$n = c v$$

$$m = n M$$

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$$n = 0.83 \frac{\text{mol}}{\text{L}} (0.0080\text{L})$$

$$m = 0.00664\text{mol} (60.06 \frac{\text{g}}{\text{mol}})$$

$$n = 0.00664\text{mol}$$

$$m = 0.40\text{g}$$