

Chemistry Review Question

1. Willy Wonka needs to know what the best fertilizer is out of ammonium sulphate, ammonium nitrate, and ammonium arsenate for his prized cocoa trees. Which of these three fertilizers has the highest percentage composition of nitrogen, as this helps plants grow. (NH_4NO_3)
2. Willy Wonka mixes 2.43 g of sodium hydroxide with 1.32 L of 2.05 M acetate acid to make his chocolate volcano erupt. If the resulting solution is evaporated from the volcano, what is the mass of the salt? Write the net ionic equation and state the number of mols of excess reactant that remains. ($m = 4.98\text{g}$, $\text{XS} = 2.65$ mols)
3. When making his special lemonade, Willy Wonka takes 120 mL of 6.80 M citric acid and adds water to it, making the volume of the solution 210 mL. What is the concentration of the diluted solution? ($C = 3.89$ M)
4. After eating too much candy, Willy Wonka begins to get heartburn. There is 15 mL of 0.80 M hydrochloric acid rising up his chest. He eats 2.87 g of Tums antacid (CaCO_3). Calculate the volume of CO_2 gas that was released in his burps at a temperature of 28.5°C and pressure of 82.0 kPa. Calculate the number of mols of excess reactant that remains as well. ($V = 0.877$ L, $\text{XS} = 0.0627$ mols)
5. While blowing up an elastic candy balloon with 12.0 L of air at 40.0 kPa, Willy Wonka accidentally releases some of the air from the candy balloon which leaves it with a volume of 10.0 L. What is the new pressure in the candy balloon? ($P = 48.0$ kPa)
6. While heating up tiny candied cereal at 120°C , the cereal begin hitting the sides of Willy Wonka's oven at a pressure of 58.0 kPa. When lowering the temperature to 40.0°C the pressure decreases. What is the new pressure? ($P = 46.2$ kPa)
7. While Willy Wonka was handing out golden tickets in his candy car, it was 26.0°C and the tire pressure was at 169 kPa with a volume of 79.0 L. Later in the day, the temperature decreases to 15.0°C and Willy Wonka's car runs over a nail. The pressure decreases to 62.0 kPa. What is the volume after the car has run over the nail? ($V = 207$ L)
8. Willy Wonka wants to determine which candy out of A, B, C, and D is the most reactive, so he can sell it without getting in a lawsuit. He places D in solutions of A and B. It reacts in A but there is no reaction in B. C was placed in solutions A, B, and D, but there was no reaction. Which is the most reactive candy? (B)

9. Willy Wonka's blueberry candy had a young girl turn blue because it was too sour. It had a pH of 2.0. Find the concentration of hydronium ions, the pOH, and concentration of hydroxide ions. ($[\text{H}_3\text{O}^+] = 0.01 \text{ mol/L}$, $\text{pOH} = 12$, $[\text{OH}^-] = 1.00 \times 10^{-12} \text{ mol/L}$)
10. Willy Wonka keeps a tank of Freon gas to keep his candies cool. If the Freon gas (CCl_2F_2) is at -20.0°C , has a volume of 340 L, and exerts a pressure of 403 kPa, how many moles are in the Freon gas? What is the density of the Freon gas? ($n = 65.1 \text{ mols}$, $D = 23.2 \text{ g/mL}$)
11. While attempting to mix some ingredients for his cake, Willy Wonka accidentally drops 600 mL of 3.40 M sulphuric acid and 8.20 g of sodium hydroxide into his mixing bowl. In an attempt to undo the accident he evaporates the contents; however, there is a lump of salt in his mixing bowl. What is the mass of the salt? State how much excess would have remained. Write the total ionic equation and the net ionic equation. If 9.20 g of salt was actually obtained, what is the percentage yield? What is the percent error? Calculate the number of ions in the salt. ($m = 14.6\text{g}$, $\text{XS} = 1.9375 \text{ mols}$, $\% \text{ yield} = 63\%$, $\% \text{ error} = 37\%$, $N = 1.85 \times 10^{23}$)