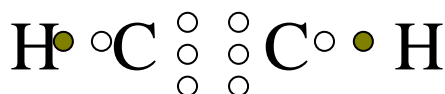


January 2005
430 Solutions

1. D
2. A
3. D
4. B
5. D
6. C

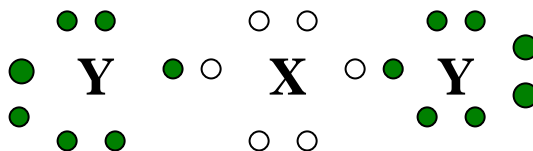
7. C and H are both non-metals. They form a covalent compound with carbon forming an octet of electrons. Hydrogen seeks to fill its energy level with two electrons.

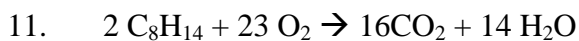


8. $\text{Cl}_2 = 35.5 \text{ g/mole Cl} * 2 \text{ mole Cl /mole Cl}_2 = 71 \text{ g/mole Cl}_2$

$$\begin{aligned} &71 \text{ g/mole Cl}_2 \left(\frac{\text{mole Cl}_2}{6.02 \times 10^{23} \text{ molecules}} \right) \\ &= 71 / 6.02 \times 10^{23} \text{ g/molecule} = 1.18 \times 10^{-22} \text{ g/molecule} \end{aligned}$$

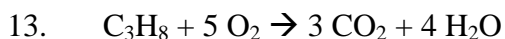
9. Li is bigger than Ne. Both have the same number of shells but the extra protons for Ne do not add to the volume; their extra positive charge (attracts negatives) just help in creating a more compact atom. This is why atomic volume or radius *decreases* across a period.
10. X and Y are both nonmetals, so they will form the covalent compound XY_2 . Do not use the criss-cross rule, which applies only to a compound formed from a metal and a non-metal!! Y has seven valence electrons; X has 6:





$$13 \text{ moles } \text{C}_8\text{H}_{14} (16\text{CO}_2/2 \text{C}_8\text{H}_{14}) = 104 \text{ moles of } \text{CO}_2$$

12. a) *positively* charged alpha particles were being repelled or deflected
b) *very few* particles were deflected; most went right through, suggesting that the nuclei were small.



$$40 \text{ g of } \text{O}_2 (\text{mole}/32 \text{ g}) = 1.25 \text{ moles of } \text{O}_2$$

$$1.25 \text{ moles of } \text{O}_2 (3 \text{CO}_2/5 \text{O}_2) = 0.75 \text{ moles of } \text{CO}_2$$

$$1.25 \text{ moles of } \text{O}_2 (4 \text{H}_2\text{O}/5 \text{O}_2) = 1.0 \text{ moles of } \text{H}_2\text{O}$$

$$0.75 \text{ moles of } \text{CO}_2 (44\text{g}/\text{mole}) = 33 \text{ g of } \text{CO}_2$$

$$1 \text{ moles of } \text{H}_2\text{O} (18 \text{ g}/\text{mole}) = 18 \text{ g of } \text{H}_2\text{O}$$

In all 51 g of products are generated.

14. $45.00 \text{ ml} / (1000 \text{ ml}/\text{L}) = 0.045 \text{ L}$

$$0.025 \text{ g } \text{Ca}(\text{OH})_2 / (\text{moles}/74 \text{ g}) = 0.000337838 \text{ moles}$$

$$0.000337838 \text{ moles} / 0.045 \text{ L} = 0.0075 \text{ moles}/\text{L}$$