

ACDB4011 CHEMISTRY QUIZ 2

28

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5p

1. (6 points) Indicate whether each of the following statements is true or false:

- ✓ ☐ T ☒ F A C-C single bond is generally shorter than a C=C double bond.
- ✓ ☐ ☒ One mole of magnesium has the same number of atoms as one mole of hydrogen gas.
- ✓ ☒ ☐ Covalent bond forms when the atom shares an electron with another atom.
- ✓ ☒ ☐ Among elements in a Main Group those with the largest radii have the smallest electronegativity.
- ✓ ☒ ☐ Angstrom, Å, is the unit of the length of a chemical bond.
- ☐ ☒ The C₂H₄ molecule has six bonding electron pairs and no lone pairs.

4p

2. (8 points) How many nitrogen atoms are there in 30.0 g of N₂O₄. Give your answer in individual atoms, not moles.

$$N = n \times Av$$

$$g = \text{moles} \times \text{mm}$$

$$N_2 = 14 \times 2 = 28 \text{ g/mol}$$

$$O_4 = 64 \text{ g/mol}$$

$$= 92 \text{ g/mol} \quad 2p$$

$$30 \text{ g} = \text{moles} \times 92 \text{ g/mol}$$

$$\text{moles} = \frac{30}{92} = 0.326 \text{ moles} \quad 2p$$

~~$$N = n \times Av$$~~

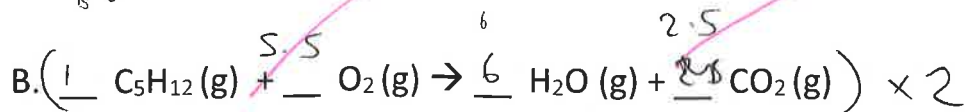
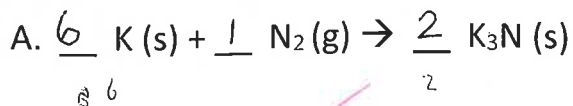
~~$$N = 0.326 \times 6.02 \times 10^{23}$$~~

~~$$= 1.92$$~~

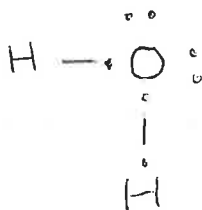
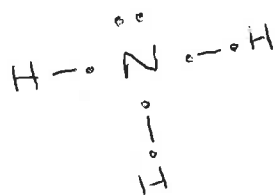
~~$$= 1.96252 \times 10^{23}$$~~

~~not~~

3. (6 points) Balance the following equations. Do not leave spaces blank. If needed, write "1" to indicate a single unit of a species.



- 7p
4. (7 points) Using the Lewis structures to support your answer, determine which molecule contains only TWO unshared pairs of electrons, H_2O or NH_3 .



H_2O has 2 unshared pairs of electrons

- 8p
5. (8 points) Potassium chlorate decomposes when heated to potassium chloride and oxygen, according to the following chemical equation: $2 \text{ KClO}_3 \text{ (s)} \rightarrow 2 \text{ KCl (s)} + 3 \text{ O}_2 \text{ (g)}$. How many grams of oxygen gas can be obtained from 24.5 g of potassium chlorate?

$$g = \# \text{ moles} \times \text{MM}$$

24.5 124

$$N = n \times \text{Av}$$

MM

K = 40

Cl = 36

O = $16 \times 3 = 48$

MM = 124 g/mol

$$\frac{0.197}{2} = 0.0985$$

$$\times 3 = 0.2955$$

2:3

0.197 : 0.2955

moles

moles = g / MM

$24.5 / 124$

= 0.197 moles

KClO_3

MM

0.2955 moles $\times$ 32

= 9.456 g