Quiz 9A

Question 1. In which of the following substances would you expect to find hydrogen bonding (3 points)?

1. Water, H2O \_\_\_\_yes\_\_\_\_\_\_\_\_\_\_
2. Hydrogen iodide, HI \_\_\_\_no\_\_\_\_\_\_\_\_\_\_\_\_
3. Ethanol, C2H5OH \_\_\_\_yes\_\_\_\_\_\_\_\_\_\_\_\_

Question 2. During the decomposition of potassium perchlorate, KClO4, 92 mL of gas are collected by the displacement of water at 25 °C. If the atmospheric pressure is 763 mmHg, and the vapor pressure of water at 25 °C is 23.8 mmHg (3 points).

What is the partial pressure of oxygen gas?

$$P\_{total}=P\_{O\_{2}}+P\_{water}⇒P\_{O\_{2}}=P\_{total}-P\_{water}$$

$$P\_{O\_{2}}=763 mmHg-23.8 mmHg=739.2 mmHg≈739 mmHg$$

Question 3. Which has a larger radius, a calcium atom or a calcium ion? Explain your reasoning (4 points).

 A calcium ion is smaller than a calcium atom. They both have the same number of protons, but the strontium ion has fewer electrons, so it is smaller.

Question 4. For each of the following draw the Lewis structure, indicate the orbital geometry, molecular geometry of the central atom, the bond angle, and polarity (10 points).

|  |  |
| --- | --- |
| Silicon dioxide, SiO2 | Phosphorus tribromide, PBr3 |
|  |  |
| Orbital geometryLinear | Orbital geometryTetrahedral |
| Molecular geometryLinear  | Molecular geometryTrigonal pyramidal |
| Bond angle180°  | Bond angle< 109.5° |
| PolarityNonpolar | PolarityPolar |

Quiz 9B

Question 1. For each of the following draw the Lewis structure, indicate the orbital geometry, molecular geometry of the central atom, the bond angle, and polarity (10 points).

|  |  |
| --- | --- |
| Carbon dioxide, CO2 | Nitrogen tribromide, NBr3 |
|  |  |
| Orbital geometryLinear | Orbital geometryTetrahedral |
| Molecular geometryLinear  | Molecular geometryTrigonal pyramidal |
| Bond angle180°  | Bond angle< 109.5° |
| PolarityNonpolar | PolarityPolar |

Question 2. Which has a larger radius, a barium atom or a barium ion? Explain your reasoning (4 points).

 A barium ion is smaller than a barium atom. They both have the same number of protons, but the strontium ion has fewer electrons, so it is smaller.

Question 3. In which of the following substances would you expect to find hydrogen bonding (3 points)?

1. Ethanol, C2H5OH \_\_\_\_yes\_\_\_\_\_\_\_\_\_\_\_\_
2. Ammonia, NH3 \_\_\_\_yes\_\_\_\_\_\_\_\_\_
3. Difluoromethane, CH2F2 \_\_\_\_no\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Question 4. During the decomposition of potassium perchlorate, KClO4, 92 mL of gas are collected by the displacement of water at 25 °C. If the atmospheric pressure is 759 mmHg, and the vapor pressure of water at 25 °C is 23.8 mmHg (3 points).

What is the partial pressure of oxygen gas?

$$P\_{total}=P\_{O\_{2}}+P\_{water}⇒P\_{O\_{2}}=P\_{total}-P\_{water}$$

$$P\_{O\_{2}}=763 mmHg-23.8 mmHg=735.2 mmHg≈735 mmHg$$