

### Lighter than Air HW

1. Which has more particles, 8.0 g of He or 40.0 g of Ar? Explain your reasoning.
2. If you have 22.4 L of the following gases at STP, which is the most dense: Ne, Ar, or Xe? Explain your reasoning.
3. Which has more particles, a balloon filled with 10 L of oxygen (O<sub>2</sub>) gas or a balloon filled with 15 L of helium (He) gas? Explain your reasoning.
4. At 25°C, which balloon has the greater volume, an oxygen (O<sub>2</sub>) balloon at 1.2 atm with a mass of 16.0 g, or a helium (He) balloon at 1.2 atm with a mass of 2.0 g?
5. Why is it useful to have a “standard temperature and pressure” for gases?
6. Convert the following at STP: (Hint: use the conversion factor 22.4 L = 6.02x10<sup>23</sup> particles at STP)
  - a. 200 L Ne = \_\_\_\_\_ atoms Ne
  - b. 6.8x10<sup>27</sup> molecules CO = \_\_\_\_\_ L CO
  - c. 5.5x10<sup>25</sup> atoms He = \_\_\_\_\_ L He
  - d. 50 L N<sub>2</sub> = \_\_\_\_\_ molecules N<sub>2</sub>

#### *Selected Answers:*

1. 8.0 g of He, because this consists of 2 moles=12.04x10<sup>23</sup> particles of He (where 40.0g of Ar consists of only 1 mole=6.02x10<sup>23</sup> particles of Ar)
2. Xe, because it is the heaviest (see its location on the periodic table).
3. A balloon filled with 15 L has more particles (the bigger the volume, the more particles there are).
4. 16.0 g of O<sub>2</sub> consists of 0.5 moles of particles and 2.0g of He also consists of 0.5 moles of particles. Thus, they have the same number of particles.
6. a. 5.4x10<sup>24</sup> atoms