DATE: NAME: CLASS:

ANSWER KEY	Chapter 4 Test Answer Key	BLM 4.3.1A

Answers to Multiple-Choice Questions

1. a
2. c
3. b
4. a
5. b
6. d
7. c
8. c
9. d
10. d
11. b
12. b
13. c
14. a
15. a
16. d
17. c
18. b
19. b
20. a

Answers to Numerical Response Questions

21. 71.0 g/mol	**22.** –91.40 °C	**23.** 736 g	**24.** 0.646 L	**25**. 2.21 g/L

Answers to Written Response Questions

26. The total pressure of the "wet" gas must be known. Since it is not possible to actually measure the pressure inside the cylinder, by making the water levels the same inside the cylinder and in the beaker, the pressure must be the same inside the cylinder and outside the cylinder. The barometric pressure can be measured in the room and this will be the same as the total pressure inside the cylinder. Using the vapour pressure of water at the recorded temperature and the total pressure of the gas in the cylinder, the partial pressure of the dry gas can be calculated as

$$P_{\text{dry gas}} = P_{\text{T}} - P_{\text{water vapour}}$$

27. a) When molecules collide with one another and the walls of the container, kinetic energy is conserved. This means that the total kinetic energy before a collision is the same as the total kinetic energy after the collision. However, because of the angle of the collisions between particles, some molecules may speed up and others slow down. At any moment, not all of the molecules are moving at the same speed. However, the average kinetic energy of all of the molecules is directly proportional to the Kelvin temperature.

b) Nitrogen molecules have a larger mass than helium molecules. If both are at the same temperature, they have the same average kinetic energy. But to keep the kinetic energies the same, the molecules with a larger mass move more slowly. Curve 2 represents the nitrogen molecules.

28.

$$\text{Number of moles} = n = \frac{m}{M} = \frac{5.0\times10^{18}\ \cancel{\text{kg}} \times 1000\ \frac{\cancel{\text{g}}}{\cancel{\text{kg}}}}{28.75\ \frac{\cancel{\text{g}}}{\text{mol}}} = 1.74\times10^{20}\ \text{mol}$$

$$\text{Number of molecules} = 1.74 \times 10^{20}\ \cancel{\text{mol}} \times 6.02 \times 10^{23}\ \frac{\text{molecules}}{\cancel{\text{mol}}}$$

$$= 1.05\times10^{44}\ \text{molecules}$$

29. $n = \dfrac{m}{M}$

$$nO_2 = \frac{4.00\ \cancel{\text{g}}}{32.0\ \frac{\cancel{\text{g}}}{\text{mol}}} = 0.125\ \text{mol}\ O_2$$

$$nH_2 = \frac{4.040\ \cancel{\text{g}}}{2.020\ \frac{\cancel{\text{g}}}{\text{mol}}} = 2.000\ \text{mol}\ H_2$$

$$nCH_4 = \frac{4.040\ \cancel{\text{g}}}{2.020\ \frac{\cancel{\text{g}}}{\text{mol}}} = 1.000\ \text{mol}$$

Total number of moles = 0.125 + 2.000 mol + 1.000 mol = 3.125 mol

$$\text{Partial pressure of } CH_4 = \frac{n_{CH_4}}{n_T} \times P_T = \frac{1.000\ \cancel{\text{mol}}}{3.125\ \cancel{\text{mol}}} \times 100\ \text{kPa} = 32\ \text{kPa}$$

30. Three ways to increase the pressure inside the cylinder are: decrease the volume by pushing down on the piston; increase the temperature at constant volume; add more of the gas at constant temperature and volume.