

### Chapters 14-17 Test Review

*The following is a mix of old quizzes and test reviews to give you extra practice on the important material for this test. The first few pages are the practice quizzes, followed by the old review.*

#### Honors Chemistry QUIZ Chapter 14 Polar Molecules and Coordination Chemistry

1. **Draw** the electron dot structure for each of the following molecules. Determine if each is **polar** or **nonpolar** and circle it. **Briefly explain your reasoning** for each molecule.

a.  $\text{Cl}_2$  (Polar or Nonpolar)

b.  $\text{AsCl}_3$  (Polar or Nonpolar)

c.  $\text{BF}_3$  (Polar or Nonpolar)

d.  $\text{HCN}$  (Polar or Nonpolar)

2. In each of the following complex ions determine :

a. the value of x, the charge on the ion

c. the ligand(s).

e. the central ion

b. the coordination number, C.N.

d. the shape

f. sketch

<u>Complex ion</u>	<u>x</u>	<u>central ion</u>	<u>ligand(s)</u>	<u>C.N.</u>	<u>shape</u>	<u>sketch</u>
$[\text{Ni}^{+2}(\text{NH}_3)_4]^x$						
$[\text{Cr}^{+3}(\text{CN}^{-1})_6]^x$						

$[W^{+3}(CO)_5(NO^{-1})]^x$						
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3. If the following combinations of substances were mixed together, what types of forces of attraction would exist between the molecules? (Consider your answers to #1 above.)  
dipole-dipole forces; dipole-induced dipole forces; London dispersion forces

- a.  $Cl_2$  and HCN \_\_\_\_\_
- b. HCN and HCN \_\_\_\_\_
- c.  $Cl_2$  and  $BF_3$  \_\_\_\_\_

**Honors Chemistry QUIZ Chapter 15 & 17**  
**Kinetic Theory & Liquids**

- State the **three** assumptions of the Kinetic Theory.
  - a)
  - b)
  - c)
- How does gas exert pressure?
- What is meant by **STP**?
- What is meant by **absolute zero**?

5. Make the following conversions. Show your work to the side.

a)  $43^{\circ}\text{C} = \underline{\hspace{2cm}} \text{ K}$

b)  $679 \text{ K} = \underline{\hspace{2cm}} ^{\circ}\text{C}$

c)  $-25^{\circ}\text{C} = \underline{\hspace{2cm}} \text{ K}$

d)  $32^{\circ}\text{F} = \underline{\hspace{2cm}} ^{\circ}\text{C}$

e)  $298 \text{ K} = \underline{\hspace{2cm}} ^{\circ}\text{C}$

6. Complete the following equalities that you must have memorized for the test.

a)  $760 \text{ mmHg} = \underline{\hspace{2cm}} \text{ atm}$

b)  $1 \text{ atm} = \underline{\hspace{2cm}} \text{ mmHg}$

c)  $101.3 \text{ kPa} = \underline{\hspace{2cm}} \text{ atm}$

d)  $101.3 \text{ kPa} = \underline{\hspace{2cm}} \text{ mmHg}$

7. An open manometer shows a mercury level 32.7 mm lower in the arm connected to a confined gas. The atmospheric pressure is 99.9 kPa. What is the pressure of the confined gas? Sketch a diagram of the experimental set-up.

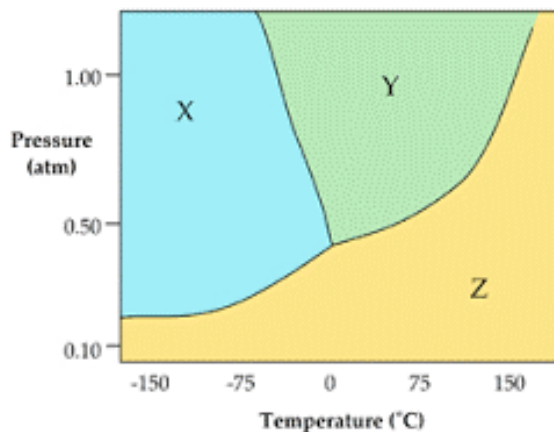
8. A closed manometer shows a mercury level difference of 470 mm. What is the pressure of the gas in kPa? Sketch a diagram of the experimental set-up.

*Vocabulary: Match the letter to the correct definition.*

- |   |                         |
|---|-------------------------|
| _____ 9. when the vapor pressure of a liquid is equal to or greater than the atmospheric pressure | A. sublimation          |
| _____ 10. the temperature and pressure where all three phases exist                               | B. triple point         |
| _____ 11. a liquid with a low boiling point that evaporates easily                                | C. volatile             |
| _____ 12. condensation  | D. vapor                |
| _____ 13. change of phase directly from a solid to a gas  | E. vapor pressure       |
| _____ 14. freezing point  | F. boiling point        |
| _____ 15. A system at equilibrium will adjust to relieve outside stress                           | G. dynamic              |
| _____ 16. changing  | H. liquefaction         |
| _____ 17. gaseous states of substances that are solids or liquids at room temperature             | I. LeChatelier's Princ. |
| _____ 18. The pressure exerted by a vapor in equilibrium with its liquid                          | J. melting point        |

*Use the phase diagram below to answer the following questions.*

- |                              |       |
|------------------------------|-------|
| 19. normal boiling point     | _____ |
| 20. normal melting point     | _____ |
| 21. triple point temperature | _____ |
| 22. triple point pressure    | _____ |
| 23. critical temperature     | _____ |
| 24. critical pressure        | _____ |



- |  |       |
|--|-------|
| 25. What state of matter exists under the following conditions: -150°C and 0.5 atm | _____ |
| 26. What state of matter exists under the following conditions: -75 °C and 0.1 atm | _____ |
| 27. What state of matter exists under the following conditions: 0 °C and 1 atm     | _____ |
| 28. What state of matter exists under the following conditions: 75°C and 0.25 atm  | _____ |

29. How much energy would it take to heat 56.3 grams of water from 25.0 °C to 113 °C?

30. How much energy would it take to cool water from 56.2 °C until it is frozen at 0.00 °C?

**Chapters 14-17 Test Review (Not Quizzes)**

	Sketch	Shape	Symmetry (Y/N)	Polar/ NonPolar
CH <sub>4</sub>				
H <sub>2</sub> S				

	Sketch	Shape	Symmetry (Y/N)	Polar/ NonPolar
<b>I<sub>2</sub></b>				
<b>PH<sub>3</sub></b>				

- 1) Determine whether the following demonstrate Dipole-Dipole, Dipole-Induced Dipole, or London Dispersion Forces. Explain your reasoning.
- a. I<sub>2</sub> and H<sub>2</sub>S →
  - b. CH<sub>4</sub> and I<sub>2</sub> →
  - c. H<sub>2</sub>S and H<sub>2</sub>S →
  - d. CH<sub>4</sub> and PH<sub>3</sub> →
- 2) Calculate the total amount of energy required to convert 36.0 grams of ice from -10.00 °C to 95.5 °C. Show your work.

- 3) Calculate the total amount of energy released when cooling 10.0 g of water vapor from 180.0 °C to -5.00 °C. Is this an endothermic or exothermic process?

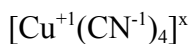
- 4) Determine the following shape(s) that can form with the following coordination numbers:

2:

4:

6:

- 5) For the following complex ions, determine the charge, central ion, name of the ligands, the coordination number, the shape, and complete a sketch of the complex ion.



SKETCH

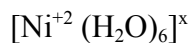
Charge (x) →

Central Ion →

Ligands →

Coord. # →

Shape →



SKETCH

Charge (x) →

Central Ion →

Ligands →

Coordination # →

Shape →

- 6) A closed manometer is filled with mercury and connected to a container of  $\text{NO}_2$  gas. The difference in the height of the mercury in the two arms is 245 mm. What is the pressure in kPa? Hint: Draw the manometer.
- 7) An open manometer is filled with mercury and connected to a container of hydrogen gas. The mercury level is 30.0 mm higher in the arm of the tube connected to the air. What is the pressure of the hydrogen (in kPa) if the air pressure is 101.3 kPa? Hint: Draw the manometer.