Name: KEY

Chem 121, Fall 2009
Test 4A

Clearly circle the correct answer.

1. A gas was trapped in an open-ended U-shaped tube as depicted below. What is the pressure of the gas in atm if the atmospheric pressure is 754 mmHg?

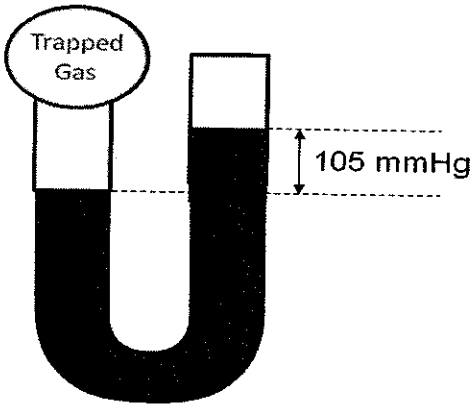
   A) 649 mmHg
   B) 754 mmHg
   C) 859 mmHg
   D) 0.854 atm
   E) 1.13 atm

E

$P_{gas} > P_{atm}$

$754\,mmHg + 105\,mmHg = 859\,mmHg$

$859\,mmHg \times \frac{1\,atm}{760\,mmHg} = 1.13\,atm$



2. A gas behaves most like a non-ideal gas under conditions of

   A) low temperature and high pressure
   B) low temperature and low pressure
   C) high temperature and low pressure
   D) high temperature and high pressure
   E) Actually it will behave like an ideal gas regardless of the temperature or the pressure as long as it remains in the gaseous state.

A

3. A sample of a gas in a cylindrical chamber with a movable piston occupied a volume of 6.414 L when the pressure was 850. mmHg and the temperature was 27.2 °C. The pressure was readjusted to 4423 mmHg by moving the piston. What was the volume occupied by the sample under the new conditions if the temperature remained constant throughout?

   A) 0.837 L
   B) 0.937 L
   C) 1.23 L
   D) 1.53 L
   E) 3.34 L

C

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

$V_2 = \frac{P_1V_1}{P_2} = \frac{(850.\,mmHg)(6.414\,L)}{4423\,mmHg} = 1.23\,L$

4. What is the mole fraction of oxygen in a container if the partial pressure of oxygen is 1.69 atm and the total pressure of all the gases in the container is 2.58 atm?

   A) 1.53
   B) 0.655
   C) 153
   D) 65.5
   E) None of the these

B

$\chi_{O_2} = \frac{P_{O_2}}{P_{total}} = \frac{1.69\,atm}{2.58\,atm} = 0.655$

5. A gas sample weighing 3.78 grams occupies a volume of 2.28 L at STP. What is the molecular mass of the sample?

   A) 8.54 g/mol
   B) 13.5 g/mol
   C) 37.1 g/mol
   D) 51.1 g/mol
   E) 193 g/mol

C

$n = \frac{PV}{RT} = \frac{(1.00\,atm)(2.28\,L)}{(0.0821\,\frac{L\,atm}{mol\,K})(273\,K)} = 0.102\,mol$

$MM = \frac{3.78\,g}{0.102\,mol} = 37.1\,g/mol$

6. How many liters of pure oxygen gas, measured at STP, are required for the complete reaction with 8.82 L of NO(*g*), also measured at STP?

$$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$$

A) 4.41 L
B) 8.82 L
C) 11.2 L
D) 17.6 L
E) 22.4 L

A

$$8.82\,L\,NO \times \frac{1\,L\,O_2}{2\,L\,NO} = 4.41\,L$$

7. Which compound will exhibit hydrogen bonding in the liquid state?
A) CH_4
B) Cl_2NH
C) H_2PCl
D) HBr
E) NCl_3

B

8. The property that measures or describes the magnitude of resistance to flow in a liquid is called
A) London forces
B) malleability
C) surface tension
D) vapor pressure
E) viscosity

E

9. The temperature at which the vapor pressure is equal to the prevailing outside atmospheric pressure is
A) the boiling point.
B) the flash point.
C) the freezing point.
D) 100 °C.
E) the normal boiling point.

A

10. Which compound should have the lowest boiling point?
A) CH_3—Br
B) CH_3—Cl
C) CH_3—F
D) CH_3—H
E) CH_3—I

D

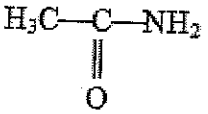
11. Which compound would you expect to be the most soluble in water. (hint: look at the forces)
A) CH_3—CH_2—Cl
B) CH_3—CH_2—F
C) CH_3—CH_2—I
D) CH_3—CH_2—S—H
E) CH_3—CH_2—O—H

E

12. C=O is found in all the species below except
A) aldehydes
B) ketones
C) amides
D) ethers
E) esters

D

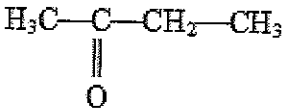
13. The compound below is which type of compound?



A) aldehyde
B) ketone
C) carboxylic acid
D) ester
E) amide

E

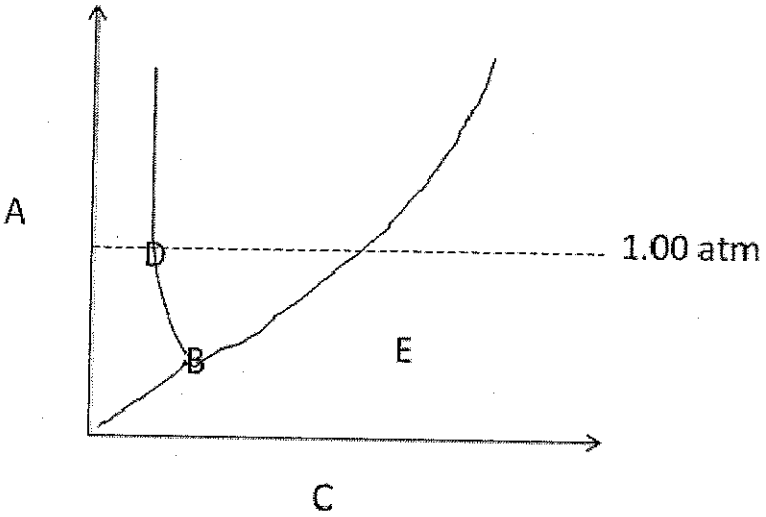
14. The compound below is which type of compound?



B

A) aldehyde
B) ketone
C) carboxylic acid
D) ester
E) amide

Use the phase diagram below to answer questions 15 – 19



15. Axis A should be labeled _____.

E

A) temperature
B) normal freezing point
C) triple point
D) critical point
E) pressure

16. Point B should be labeled _____.

C

A) temperature
B) normal freezing point
C) triple point
D) critical point
E) pressure

17. Axis C should be labeled _____.

A

A) temperature
B) normal freezing point
C) triple point
D) critical point
E) pressure

18. Region E should be labeled _____.

D

A) temperature
B) solid
C) liquid
D) gas
E) pressure

19. Point D should be labeled _____.

B

A) temperature
B) normal freezing point
C) triple point
D) critical point
E) pressure

20. Which of the following protein chains has Lys in the terminal amine position?
    A) Asp-Gly-Gly-Ser-Lys-Ser
    B) Ser-Lys-Ser-Gly-Gly-Asp
    C) Lys-Ser-Gly-Asp-Ser-Gly
    D) Gly-Ser-Asp-Gly-Ser-Lys
    E) None of these

C

21. Marcromolecules that store large amounts of energy are called _____.
    A) Amino acids
    B) Nucleic acids
    C) Monosaccharides
    D) Polysaccharides
    E) Triacylglycerols

D

22. Which of the following can affect protein shape and function?
    A) heat
    B) poisons
    C) certain solvents
    D) pH
    E) All of these

E

23. Which of the following is the complimentary base pairing for AGGGCUGUA? RNA
    A) AGGGCUGUA
    B) AUGUCGGGA
    C) UCCCGACAU
    D) UACAGCCCU
    E) None of these

UCCCGACAU

C

24. RNA contains:
    A) Deoxyribose, phosphate and sugar.
    B) Thymine, adenine, and guanine.
    C) Hydrogen bonding, ribose and uracil.
    D) Adipose, uracil and ribose.
    E) None of these.

C

25. In the cooling curve below, what is happening along line A?
    A) A gas is condensing.
    B) A liquid is freezing.
    C) Heat is being removed from a liquid.
    D) Heat is being removed from a gas.
    E) None of these.

B