Review:

1. Temperature is a measure of the _____ _____ energy of the molecules in a sample.
2. A gas exerts pressure on its container because the molecules _____ with the walls.
3. According to the assumptions of KMT…
   > The molecules of an ideal gas are in constant, _____ motion.
   > The molecules of an ideal gas have no _____.
   > Collisions in an ideal gas are completely _____.
   > There are no attractive or repulsive _____ in an ideal gas.

May 17-8:08 AM

Review:

1. Temperature is a measure of the average kinetic energy of the molecules in a sample.
2. A gas exerts pressure on its container because the molecules collide with the walls.
3. According to the assumptions of KMT…
   > The molecules of an ideal gas are in constant, random motion.
   > The molecules of an ideal gas have no volume.
   > Collisions in an ideal gas are completely elastic.
   > There are no attractive or repulsive forces in an ideal gas.

May 17-8:08 AM

Review:

Complete the chart below:

Relationship	Pressure	Volume	Temperature	# of moles
	increases	*constant*		*constant*
	increases		*constant*	*constant*
	constant		**increases**	*constant*
		constant	*constant*	**increases**

May 17-8:09 AM

Review:

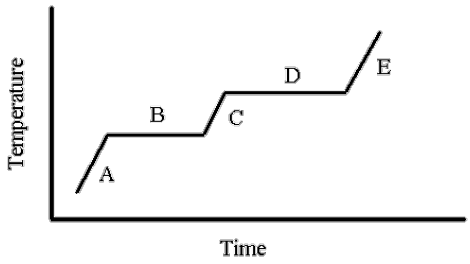
Complete the chart below:

Relationship	Pressure	Volume	Temperature	# of moles
direct	**increases**	*constant*	↑	*constant*
indirect	**increases**	↓	*constant*	*constant*
direct	*constant*	↑	**increases**	*constant*
direct	↑	*constant*	*constant*	**increases**

May 17-8:09 AM

Review:

Use the graph to answer the following questions:



4. What letter represents the melting point?

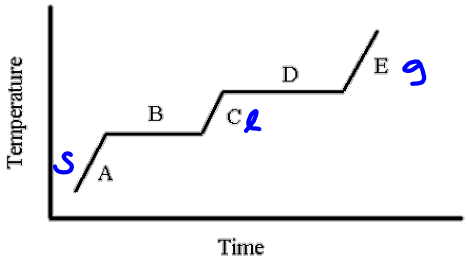
5. What letter represents the substance in the gaseous phase?

6. Write the equation for the process happening as you move from C - B -A.

May 17-8:09 AM

Review:

Use the graph to answer the following questions:



4. What letter represents the melting point?

B

5. What letter represents the substance in the gaseous phase?

E

6. Write the equation for the process happening as you move from C - B -A.

freezing $\ell \rightarrow s$ $H_2O(\ell) \rightarrow H_2O(s)$

May 17-8:09 AM

Review:

7. What are the conditions for STP?

8. Calculate the volume of 5 moles of a gas at STP.

9. How many grams of H_2 gas are in a 10.0 L container at 2.00 atm and 30°C?

May 17-8:09 AM

Review:

7. What are the conditions for STP?

273K, 1atm

8. Calculate the volume of 5 moles of a gas at STP.

$PV = nRT$ $n = 5\,mol$
$P = 1\,atm$ $R = 0.0821 \frac{L \cdot atm}{mol \cdot K}$
$V = ?\,L$ $T = 273K$

$1 \cdot V = 5 \cdot 0.0821 \cdot 273$
$1 \cdot V = 112.1$
$V = 112.1\,L$

9. How many grams of H_2 gas are in a 10.0 L container at 2.00 atm and 30°C?

$PV = nRT$ $R = 0.0821 \frac{L \cdot atm}{mol \cdot K}$
$P = 2\,atm$ $T = 30°C + 273 = 303K$
$V = 10.0\,L$ $2 \cdot 10 = n \cdot 0.0821 \cdot 303$
$n = ?\,mol \rightarrow g$ $\frac{20}{24.7} = \frac{n \cdot 24.7}{24.7}$

$= .804\,mol\,H_2 \times \frac{2\,g}{1\,mol\,H_2}$
$= 1.61\,g\,H_2$

May 17-8:09 AM

REVIEW

10. A sample of 5.0 g of copper was heated from 20°C to 80°C. How much energy was used to heat Cu? (Specific heat capacity of Cu is 0.092 cal/g °C)

May 17-8:10 AM

REVIEW

10. A sample of 5.0 g of copper was heated from 20°C to 80°C. How much energy was used to heat Cu? (Specific heat capacity of Cu is 0.092 ~~cal~~ J/g °C)

$q = mc\Delta T$

$q = ?\ J$

$m = 5.0g$

$C = 0.092\ J/g \cdot {}^\circ C$

$\Delta T = 60^\circ C$

$q = 5.0g \cdot 0.092 \cdot 60$

$= 27.6J$

May 17-8:10 AM

REVIEW

11. Calculate the ΔH°_{rxn} using the chemical equation and ΔH°_f values below.

$$NaOH(s) + HCl(g) \longrightarrow NaCl(s) + H_2O(g)$$

ΔH°_f (NaOH(s)) = -426.7 kJ/mol

ΔH°_f (HCl(g)) = -92.3 kJ/mol

ΔH°_f (NaCl(s)) = -411.0 kJ/mol

ΔH°_f (H_2O(g)) = -241.8 kJ/mol

May 17-8:12 AM

REVIEW

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products − reactants

− ΔH°_f (NaCl(s)) = -411.0 kJ/mol

− ΔH°_f (H_2O(g)) = -241.8 kJ/mol

$[(-411.0 + (-241.8)] - [-426.7 + (-92.3)]$

$-652.8 - (-519)$ $= -133.8$ kJ/mol

May 17-8:12 AM

Review:

12. Determine if the following are exothermic or endothermic.
    a. +ΔH
    b. -ΔH
    c. $H_2O(l) \rightarrow H_2O(g)$
    d. $H_2O(l) \rightarrow H_2O(s)$
    e. $2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g) + 200kJ$
    f. $2\ N_2O_5\ (g) + 110\ kJ \rightarrow 4NO_2(g) + O_2(g)$

May 17-8:12 AM

Review:

releases energy — absorb energy

12. Determine if the following are exothermic or endothermic.
    a. +ΔH endo
    b. -ΔH exo
    c. $H_2O(l) \rightarrow H_2O(g)$ endo
    d. $H_2O(l) \rightarrow H_2O(s)$ exo
    e. $2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g) + 200kJ$ exo
    f. $2\ N_2O_5\ (g) + 110\ kJ \rightarrow 4NO_2(g) + O_2(g)$ endo

May 17-8:12 AM

Review:

13. In a household radiator, 1000. g of steam at 100.°C condenses (changes from gas to liquid). How much heat is released? (ΔH_{vap}= 40.6 kJ/mol)

May 17-8:13 AM

Review:

13. In a household radiator, 1000. g of steam at 100.°C condenses (changes from gas to liquid). How much heat is released? (ΔH_{vap}= 40.6 kJ/mol)

H_2O

$$1000.\ g\ H_2O \times \frac{1\ mol\ H_2O}{18\ g\ H_2O} \times \frac{40.6\ kJ}{1\ mol\ H_2O} = 2{,}256\ kJ$$

H = 2 x 1 = 2

O = 1 x 16 = 16

18 g/mol

May 17-8:13 AM

Review:

14. Predict the sign of entropy for the following reactions:

a. $ClF(g) + F_2(g) \rightarrow ClF_3(g)$

b. $NH_3(g) \rightarrow NH_3(aq)$

c. $CH_3OH(l) \rightarrow CH_3OH(aq)$

d. $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$

May 17-8:13 AM

Review:

ΔS – disorder

$+\Delta S$ ↑disorder

$-\Delta S$ ↓disorder

14. Predict the sign of entropy for the following reactions:

a. $ClF(g) + F_2(g) \rightarrow ClF_3(g)$ (2 mol → 1 mol) $-\Delta S$

b. $NH_3(g) \rightarrow NH_3(aq)$ $-\Delta S$

$S < l < aq < g$

c. $CH_3OH(l) \rightarrow CH_3OH(aq)$

$+\Delta S$

d. $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$

9 mol → 10 mol

$+\Delta S$

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