

INFORMATION, SCRAP, AND COVER PAGE

*** KEEP YOUR WORK AND YOUR ANSWERS COVERED ***

This page contains information which may or may not be needed. This page can also be used for scrap paper or for cover paper. THIS PAGE WILL NOT BE COLLECTED. TEAR THIS PAGE OFF THE EXAM.

Temperature conversion $T(\text{K}) = T(^{\circ}\text{C}) + 273$

Gases $\text{atm} = 760 \text{ mmHg} = 760 \text{ Torr}$

$$PV = nRT$$

$$R = 0.08206 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}} = 8,314 \frac{\text{g} \cdot \text{m}^2}{\text{s}^2 \cdot \text{mol} \cdot \text{K}}$$

$$d = \frac{PM}{RT}$$

Energy units $\text{Cal} = 4.184 \text{ kJ}$

Heat and Heat Capacity $q = \Delta T \times \text{mass} \times c$

For $\text{H}_2\text{O}(l)$ $c = 4.18 \text{ J}/(\text{g} \cdot ^{\circ}\text{C})$

Standard Molar Enthalpies of Formation (kJ or kJ/mol)

$\text{Ba}^{2+}(aq)$	-537.64	$\text{H}_2\text{O}(l)$	-285.83	$\text{MgO}(s)$	-601.24
$\text{BaCO}_3(s)$	-1,216.3	$\text{H}_2\text{O}(g)$	-241.83	$\text{MgCO}_3(s)$	-1,111.7
$\text{BaSO}_4(s)$	-1,473.2	$\text{H}_2\text{O}_2(aq)$	-191.17	$\text{SO}_2(g)$	-296.84

PRINT NAME _____

SIGN NAME _____

CIRCLE your recitation section in the list below.

A: W 3:00 HM 217	B: F 10:00 LF 102
C: F 8:00 LF 130	D: M 8:00 LF 130
E: M 9:00 LF 130	F: T 3:00 HM 221
G: W 8:00 LF 130	H: Th 12:00 NS 317

SCORED GRADE: _____

All answers should be with the correct significant figures.

Atomic weights are provided in the Periodic Table. These values must be used.

The Periodic Table and Information Page will not be collected. They may be used as scratch paper or as cover paper. Do not turn them in.

Be certain your answers are clear. If an answer is not clear, it can be considered wrong.

Problems marked with ** in the margin are from the assigned homework. These total 29 points.

Place your name in the space provided at the top of each question page. This helps to identify the pages if they are accidentally separated during grading and processing.

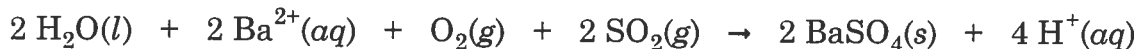
Work promptly. Use your time effectively.

****KEEP YOUR WORK AND ANSWERS COVERED.****

1. (24 pts) Indicate whether each statement is true (T) or false (F). Be certain T or F is clearly indicated.

- _____ Most of the volume of air which you breathe has no matter in it.
- _____ The pressure of an ideal gas is proportional to its concentration and temperature.
- _____ In general, at the same temperature, molecules of $\text{CO}_2(g)$ move faster than molecules of $\text{NH}_3(g)$.
- _____ For an exothermic process, the system ends with more energy than it had initially.
- _____ At 100 °C, one mole of $\text{H}_2\text{O}(l)$ has more energy than one mole of $\text{H}_2\text{O}(g)$.
- _____ The combustion of $\text{H}_2(g)$ is endothermic.
- _____ ΔH_f° for $\text{C}(\text{diamond})$ is zero.
- _____ An endothermic process can absorb heat energy without changing temperature.

- ** 2. (6 pts) The following equation is balanced.



Circle the ΔH° (in kJ) for this reaction.

- | | | | | | |
|--------|--------|--------|--------|--------|--------|
| -448.3 | -497.2 | -516.9 | -552.0 | -623.3 | -674.7 |
| -705.8 | -780.9 | -821.8 | -864.3 | -938.4 | -953.9 |

last name: _____

3. (5 pts) A gas is originally contained in a 15.8 L tank at $-10.^\circ\text{C}$ at 0.765 atm pressure. This gas is then transferred to a 10.0 L tank and stored at 23°C . Circle the pressure (in atm) of the gas at the final conditions.

0.503	0.619	0.773	0.862	0.980	1.03
1.17	1.28	1.36	1.45	1.50	1.61

- ** 4. (6 pts) Consider the reaction of excess tin metal with 37.6 g nitric acid to produce tin(II) nitrate and hydrogen gas. The hydrogen gas is collected in a volume of 14.6 L at a temperature of 281 K. Circle the pressure (in atm) of the hydrogen gas.

0.211	0.251	0.303	0.372	0.436	0.471
0.508	0.563	0.659	0.682	0.717	0.763

5. (6 pts) Balance the following equation. All reactants and products are shown.



- ** 6. (6 pts) Solid magnesium oxide can be prepared by direct combustion of Mg(s) with $\text{O}_2(g)$. Circle the change in enthalpy (in kJ) for this reaction when 14.2 g of magnesium are reacted.

-106	-177	-235	-280.	-351	-378
-442	-479	-515	-533	-608	-670.

last name: _____

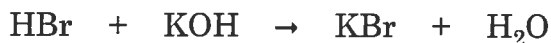
7. (5 pts) 15.0 g of $\text{H}_2\text{O}(l)$ at $18.0\text{ }^\circ\text{C}$ absorbs 422 J of heat energy, causing its temperature to increase. Circle the final temperature (in $^\circ\text{C}$) of the water.

18.3	19.5	20.1	21.7	22.2	23.5
24.7	25.9	26.3	27.5	28.4	29.7

- ** 8. (5 pts) Circle the gases below which are denser than $\text{CO}_2(g)$ at the same temperature and pressure.

C_2H_4	BF_3	SF_4	Ar	Cl_2	HF
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- ** 9. (6 pts) An 8.00 g solution of hydrobromic acid was titrated using a solution of potassium hydroxide, according to the following equation.



The potassium hydroxide solution was 0.2316 M, and the titration required 18.70 mL to reach end point. Circle the percent by mass of HBr in the sample.

4.38%	5.62%	6.19%	7.06%	8.43%	9.12%
10.6%	11.7%	12.4%	13.1%	14.7%	15.8%

10. (6 pts) Write the balanced, formation equation for solid silver acetate. Put your final answer on the line below. Be sure to include all phases!
