

2015 SU CHE 111 Final Exam - Confidential

Your Name: _____

Your ID: _____

of Questions: 12

Date and Time of Exam Creation: Fri, Jul 24, 2015 @ 11:10:21

Total Exam Points: 160.00

PERIODIC TABLE OF THE ELEMENTS [1991 IUPAC Atomic Weights]																						
_IA 1																	_VIIA 17	_VIIIA 18				
1 H 1.00794																	1 H 1.00794	2 He 4.002602				
		_IIA 2															_IIIA 13	_IVA 14	_VA 15	_VIA 16		
3 Li 6.941	4 Be 9.012182															5 B 10.811	6 C 12.011	7 N 14.00674	8 O 15.9994	9 F 18.9984032	10 Ne 20.1797	
11 Na 22.989768	12 Mg 24.3050	_IIIB 3	_IVB 4	_VB 5	_VIB 6	_VIIB 7	_VIII 8 9 10		_IB 11	_IIB 12	13 Al 26.981539	14 Si 28.0855	15 P 30.973762	16 S 32.066	17 Cl 35.4527	18 Ar 39.948						
19 K 39.0983	20 Ca 40.078	21 Sc 44.955910	22 Ti 47.88	23 V 50.9415	24 Cr 51.9961	25 Mn 54.93805	26 Fe 55.847	27 Co 58.93320	28 Ni 58.6934	29 Cu 63.546	30 Zn 65.39	31 Ga 69.723	32 Ge 72.61	33 As 74.92159	34 Se 78.96	35 Br 79.904	36 Kr 83.80					
37 Rb 85.4678	38 Sr 87.62	39 Y 88.90585	40 Zr 91.224	41 Nb 92.90638	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.90550	46 Pd 106.42	47 Ag 107.8682	48 Cd 112.411	49 In 114.818	50 Sn 118.710	51 Sb 121.757	52 Te 127.60	53 I 126.90447	54 Xe 131.29					
55 Cs 132.90543	56 Ba 137.327	57 La 138.9055	72 Hf 178.49	73 Ta 180.9479	74 W 183.84	75 Re 186.207	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.96654	80 Hg 200.59	81 Tl 204.3833	82 Pb 207.2	83 Bi 208.98037	84 Po (210)	85 At (210)	86 Rn (220)					
87 Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110	111	112											
		Lanthanide Series																				
		58 Ce 140.115	59 Pr 140.90765	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.965	64 Gd 157.25	65 Tb 158.92534	66 Dy 162.50	67 Ho 164.93032	68 Er 167.26	69 Tm 168.93421	70 Yb 173.04	71 Lu 174.967							
		Actinide Series																				
		90 Th 232.0361	91 Pa 231.03588	92 U 238.0289	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)							

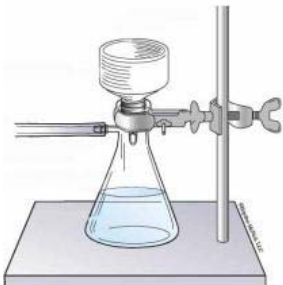
Molar Volume of ideal gas at STP = 22.4 liter	Ideal Gas Constant: $R = 8.314 \text{ J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$	Speed of light, $c = 3.00 \times 10^8 \text{ m}\cdot\text{s}^{-1}$
Faraday Constant, $F = 9.6485 \times 10^4 \text{ C/mol electrons}$	$R = 1.987 \text{ cal}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$	Rydberg Constant, $R_H = 2.18 \times 10^{-18} \text{ J}$
Avogadro's Number, $N = 6.022 \times 10^{23} \text{ mol}^{-1}$	$R = 8.206 \times 10^{-2} \text{ liter}\cdot\text{atm}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$	Electronic Charge, $e = 1.602 \times 10^{-19} \text{ C}$
Planck's Constant, $h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$		Atomic mass unit, $u = 1.6605 \times 10^{-24} \text{ g}$

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Question #: 1

Which of the following equipment setups would you use for a calorimetry experiment?

A.



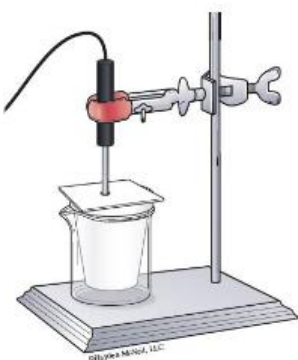
B.



C.



D.



Question #: 2

Which of the following students is wearing appropriate Personal Protective Equipment (PPE), minus goggles, for the General Chemistry Lab?

A.



B.



C.



D.



Question #: 3

Which of the following provides an appropriate level of eye protection from fumes and splashes for use in the General Chemistry Lab?

A.



B.



C.

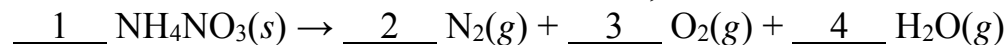


D.



Question #: 4

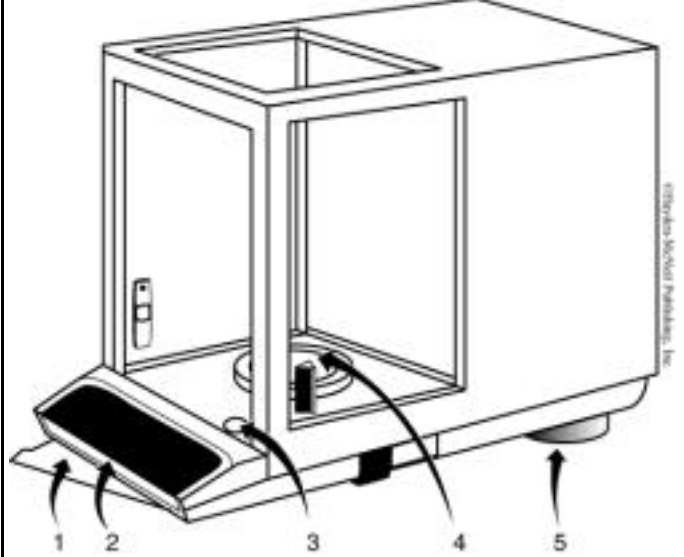
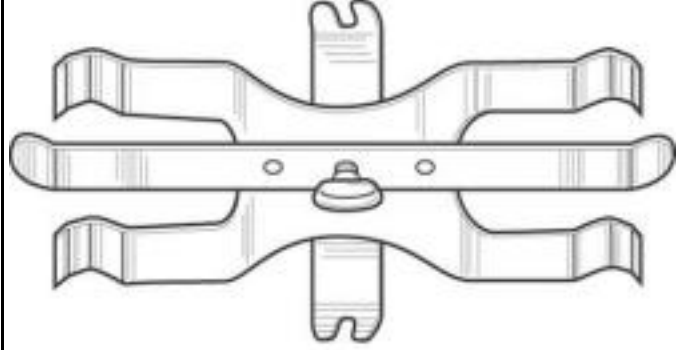
Balance the following chemical reaction by filling in the blank coefficients below with the smallest possible whole numbers. If the coefficient is 1, enter the number 1.

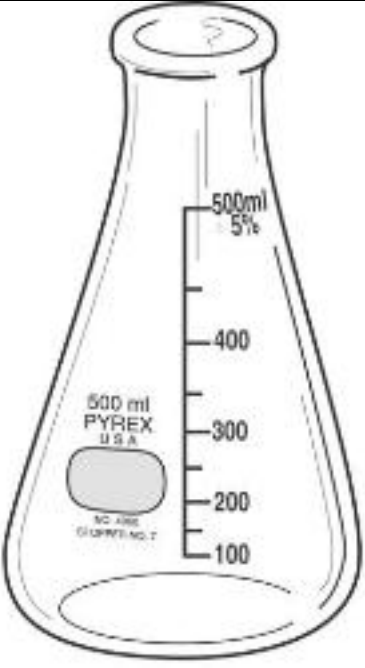




1. _____
 2. _____
 3. _____
 4. _____
-

Question #: 5

Identify the following pieces of laboratory equipment.

Equipment	Identity
	<p style="text-align: center;"><u>1</u></p>
	<p style="text-align: center;"><u>2</u></p>

Equipment	Identity
	<p style="text-align: center;"><u>3</u></p>
	<p style="text-align: center;"><u>4</u></p>
	<p style="text-align: center;"><u>5</u></p>

Question #: 6

A metal cube having a mass of 112 grams is dropped into a graduated cylinder containing 30.00 mL of water. This causes the water level to rise to 39.50 mL. What is the density of the cube?

- A. 2.86 g/mL
 - B. 10.8 g/mL
 - C. 11.8 g/mL
 - D. 3.74 g/mL
-

Question #: 7

What is the net ionic equation for the reaction between the reagents shown below?
magnesium chloride + sodium hydroxide

Complete the table shown below with your response.

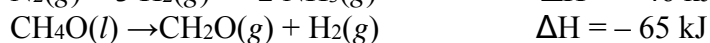
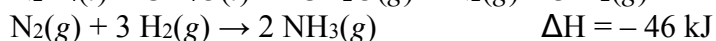
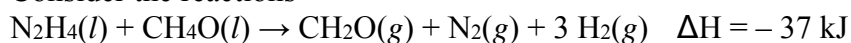
Substance	State		Substance	State		Substance	State
<u> 1 </u>	(<u> 2 </u>)	+	<u> 3 </u>	(<u> 4 </u>)	→	<u> 5 </u>	(<u> 6 </u>)

You do not need to balance the reaction.

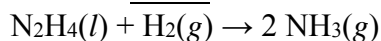
- 1. _____
 - 2. _____
 - 3. _____
 - 4. _____
 - 5. _____
 - 6. _____
-

Question #: 8

Consider the reactions



The ΔH for the overall reaction shown below is 1 kJ/mol. Do not include units in your answer.



- 1. _____

Question #: 9

What is the percent composition of each element in $(\text{NH}_4)_2\text{S}$?

N: 1 %

H: 2 %

S: 3 %

1. _____

2. _____

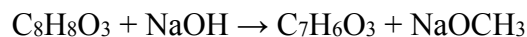
3. _____

Question #: 10

Write a brief procedure on how you would determine the concentration of citric acid ($\text{H}_3\text{C}_6\text{H}_5\text{O}_3$) using sodium hydroxide and materials available in the lab. Your response will not be saved until you click the "save" icon.

Question #: 11

Salicylic acid (FW = 138.12 g/mol), a reagent used to make aspirin, can itself be produced from oil of wintergreen (methyl salicylate, FW = 152.15 g/mol, $d = 1.18 \text{ g/mol}$ at 20°C), by reacting it with sodium hydroxide. This reaction is shown below. You measured out 7.14 mL of oil of wintergreen and 9.59 g of sodium hydroxide (FW = 39.997 g/mol). Experimentally, you produced 6.48 g of salicylic acid. What is your percent yield for this reaction?



A. 4.68 %

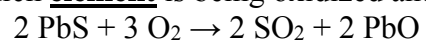
B. 102 %

C. 56.4 %

D. 84.7 %

Question #: 12

Consider the following reaction. Which **element** is being oxidized and which is being reduced?



 1 is oxidized.

 2 is reduced.

1. _____

2. _____

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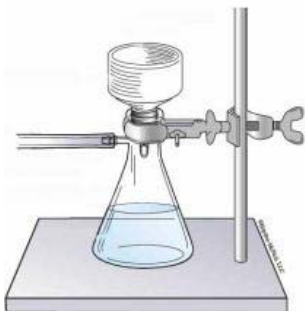
Molar Volume of ideal gas at STP = 22.4 liter	Ideal Gas Constant: R = 8.314 J·K ⁻¹ ·mol ⁻¹	Speed of light, c = 3.00 × 10 ⁸ m·s ⁻¹
Faraday Constant, F = 9.6485 × 10 ⁴ C/mol electrons	R = 1.987 cal·K ⁻¹ ·mol ⁻¹	Rydberg Constant, R _H = 2.18 × 10 ¹⁸ J
Avogadro's Number, N = 6.022 × 10 ²³ mol ⁻¹	R = 8.206 × 10 ⁻² liter·atm·K ⁻¹ ·mol ⁻¹	Electronic Charge, e = 1.602 × 10 ⁻¹⁹ C
Planck's Constant, h = 6.626 × 10 ⁻³⁴ J·s		Atomic mass unit, u = 1.6605 × 10 ⁻²⁴ g

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Question #: 1

Which of the following equipment setups would you use for a calorimetry experiment?

A.



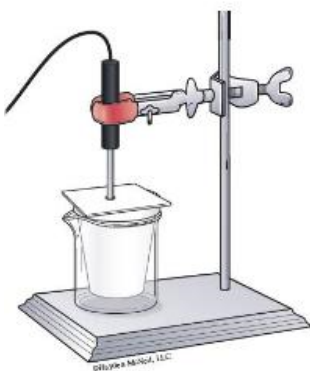
B.



C.



✓D.



Item Weight: 5.0

Question #: 2

Which of the following students is wearing appropriate Personal Protective Equipment (PPE), minus goggles, for the General Chemistry Lab?

A.



B.



✓C.



D.



Item Weight: 5.0

Question #: 3

Which of the following provides an appropriate level of eye protection from fumes and splashes for use in the General Chemistry Lab?

A.



B.



C.



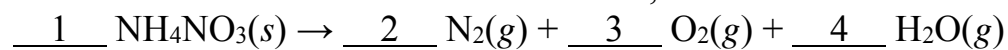
✓D.



Item Weight: 5.0

Question #: 4

Balance the following chemical reaction by filling in the blank coefficients below with the smallest possible whole numbers. If the coefficient is 1, enter the number 1.



1. 2

2. 2

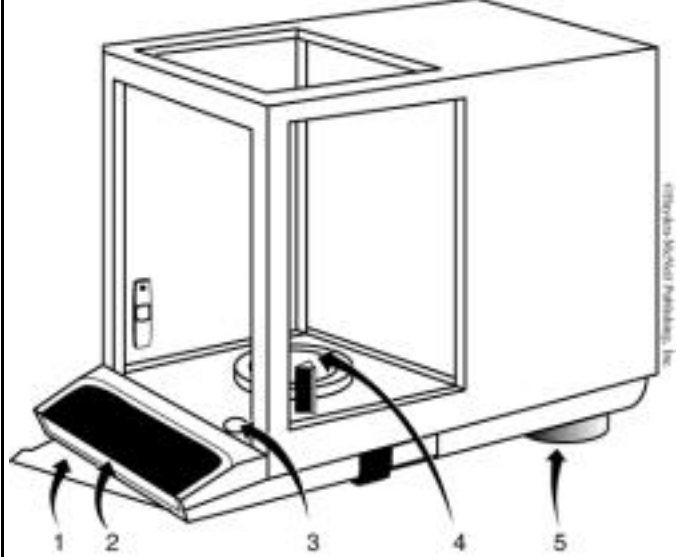
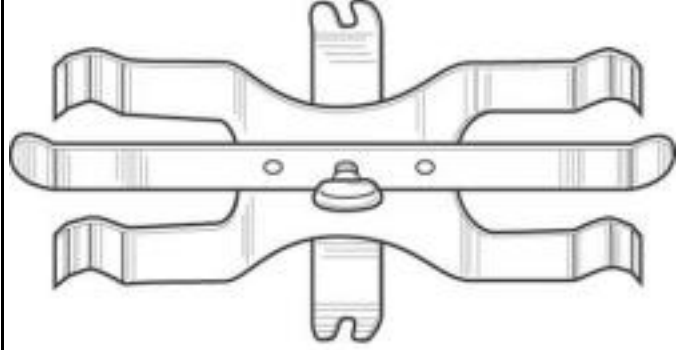
3. 1

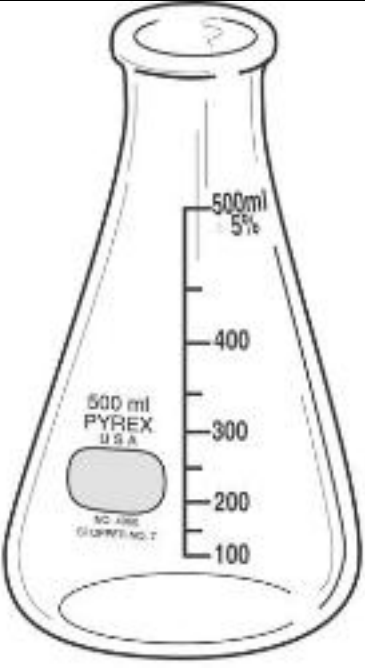


4. 4

Item Weight: 20.0

Question #: 5

Identify the following pieces of laboratory equipment.

Equipment	Identity
	<p style="text-align: center;"><u>1</u></p>
	<p style="text-align: center;"><u>2</u></p>

Equipment	Identity
	<p style="text-align: center;"><u>3</u></p>
	<p style="text-align: center;"><u>4</u></p>
	<p style="text-align: center;"><u>5</u></p>

1. analytical balance| balance|
2. buret clamp| burette clamp|

3. Erlenmeyer flask
4. test tube brush| tube brush|
5. watch glass

Item Weight: 25.0

Question #: 6

A metal cube having a mass of 112 grams is dropped into a graduated cylinder containing 30.00 mL of water. This causes the water level to rise to 39.50 mL. What is the density of the cube?

- A. 2.86 g/mL
- B. 10.8 g/mL
- ✓C. 11.8 g/mL
- D. 3.74 g/mL

Item Weight: 5.0

Question #: 7

What is the net ionic equation for the reaction between the reagents shown below?
magnesium chloride + sodium hydroxide

Complete the table shown below with your response.

Substance	State		Substance	State		Substance	State
<u> 1 </u>	<u>(2)</u>	+	<u> 3 </u>	<u>(4)</u>	→	<u> 5 </u>	<u>(6)</u>

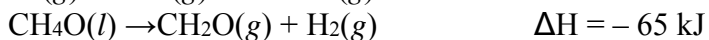
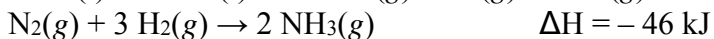
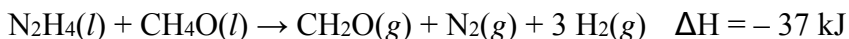
You do not need to balance the reaction.

1. Mg+2|Mg⁺²|Mg2+|Mg²⁺|
2. aq|aqueous|
3. OH-|OH⁻|
4. aq|aqueous|
5. Mg(OH)2
6. s|solid|

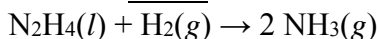
Item Weight: 30.0

Question #: 8

Consider the reactions



The ΔH for the overall reaction shown below is 1 kJ/mol. Do not include units in your answer.



1. -18|-18kJ|-18 kJ|-18kJ/mol|-18 kJ/mol|

Item Weight: 5.0

Question #: 9

What is the percent composition of each element in $(\text{NH}_4)_2\text{S}$?

N: 1 %

H: 2 %

S: 3 %

1. 41.110%|41.110|41.110 %|41.11|41.11%|41.11 %|

2. 11.833%|11.833|11.833 %|11.83|11.83 %|11.83%|

3. 47.057%|47.057|47.057 %|47.06|47.06 %|47.06%|

Item Weight: 15.0

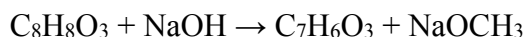
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Item Weight: 30.0

Question #: 11

Salicylic acid (FW = 138.12 g/mol), a reagent used to make aspirin, can itself be produced from oil of wintergreen (methyl salicylate, FW = 152.15 g/mol, d = 1.18 g/mol at 20 °C), by reacting it with sodium hydroxide. This reaction is shown below. You measured out 7.14 mL of oil of wintergreen and 9.59 g of sodium hydroxide (FW = 39.997 g/mol). Experimentally, you produced 6.48 g of salicylic acid. What is your percent yield for this reaction?

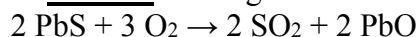


- A. 4.68 %
- B. 102 %
- C. 56.4 %
- ✓D. 84.7 %

Item Weight: 5.0

Question #: 12

Consider the following reaction. Which **element** is being oxidized and which is being reduced?



 1 is oxidized.
 2 is reduced.

1. S|sulfur|S2-|S-2|
2. O|oxygen|O2|

Item Weight: 10.0