

The Periodic Table

<i>IA</i> H 1 1.01																	<i>VIIIA</i> He 2 4.00		
<i>IIA</i> Li 3 6.94	Be 4 9.01											<i>IIIA</i> B 5 10.81	<i>IVA</i> C 6 12.01	<i>V</i> N 7 14.01	<i>VIA</i> O 8 16.00	<i>VIIA</i> F 9 19.00	Ne 10 20.18		
Na 11 22.99	Mg 12 24.31			<i>IIIB</i> Sc 21 44.96	<i>IVB</i> Ti 22 47.88	<i>VB</i> V 23 50.94	<i>VIB</i> Cr 24 52.00	<i>VII</i> Mn 25 54.94	<i>VIII</i> Fe 26 55.85	<i>VIII</i> Co 27 58.93	<i>VIII</i> Ni 28 58.69	<i>IB</i> Cu 29 63.55	<i>IIB</i> Zn 30 65.39	<i>IIIA</i> Ga 31 69.72	<i>IVA</i> Ge 32 72.61	<i>V</i> As 33 74.92	<i>VIA</i> Se 34 78.96	<i>VIIA</i> Br 35 79.90	Kr 36 83.80
Rb 37 85.47	Sr 38 87.62	Y 39 88.91	Zr 40 91.22	Nb 41 92.91	Mo 42 95.94	Tc 43 (97.9)	Ru 44 101.07	Rh 45 102.91	Pd 46 106.42	Ag 47 107.87	Cd 48 112.41	In 49 114.82	Sn 50 118.71	Sb 51 121.76	Te 52 127.60	I 53 126.90	Xe 54 131.29		
Cs 55 132.91	Ba 56 137.33	La 57 138.91	Hf 72 178.49	Ta 73 180.95	W 74 183.85	Re 75 186.21	Os 76 190.2	Ir 77 192.22	Pt 78 195.08	Au 79 197.97	Hg 80 200.59	Tl 81 204.38	Pb 82 207.2	Bi 83 208.98	Po 84 (209)	At 85 (210)	Rn 86 (222)		
Fr 87 223.02	Ra 88 226.03	Ac 89 227.03	Rf 104 (261)	Db 105 (262)	Sg 106 263	Bh 107 (262)	Hs 108 (265)	Mt 109 (266)	Ds 110 (271)	Rg 111 (272)	Uub 112 (285)	Uut 113 (284)	Uuq 114 (289)	Uup 115 (288)					

Ce 58 140.12	Pr 59 140.91	Nd 60 144.24	Pm 61 (145)	Sm 62 150.36	Eu 63 152.97	Gd 64 157.25	Tb 65 158.93	Dy 66 162.50	Ho 67 164.93	Er 68 167.26	Tm 69 168.93	Yb 70 173.04	Lu 71 174.97
Th 90 232.04	Pa 91 231.04	U 92 238.03	Np 93 237.05	Pu 94 (240)	Am 95 243.06	Cm 96 (247)	Bk 97 (248)	Cf 98 (251)	Es 99 252.08	Fm 100 257.10	Md 101 (257)	No 102 259.10	Lr 103 262.11

Solubility Guidelines:

Soluble Ionic Compounds	
1.	All sodium, potassium and ammonium salts are soluble.
2.	All nitrate, acetate, chlorate and perchlorate salts are soluble
3.	All chloride, bromide and iodide salts are soluble. Except those that contain: lead, silver or mercury(I) (Hg_2^{2+}).
4.	All fluoride salts are soluble. Except those that contain: magnesium, calcium, strontium, barium or lead.
5.	All sulfate salts are soluble. Except those that contain: calcium, silver, mercury(I), strontium, barium or lead.
Not Soluble Ionic Compounds	
1.	All hydroxide and oxide salts are not soluble. Except those that contain: sodium, potassium or barium.
2.	All sulfide salts are not soluble. Except those that contain: sodium, potassium ammonium or barium.
3.	All carbonate and phosphate salts are not soluble. Except those that contain: sodium, potassium or ammonium.

SID

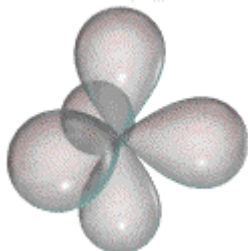
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Last _____

First _____

Question 1
9 Points

Classify each of the following molecules as polar or nonpolar?

1. SO_3 _____3. I_3^- _____2. NCl_3 _____Question 2
10 Points

There are _____ hybrid orbitals represented by the picture on the left. They are composed of* _____
s p d
atomic orbitals, corresponding to _____ hybridization. They have the electron pair geometry _____ with bond angles of _____.

* - Give the number of each of these orbitals that make the hybrid orbital depicted.

Question 3
6 PointsA molecule has sp^2 hybridization with 1 lone pair:

a) The electron pair geometry of this molecule is _____

b) The geometry of this molecule is _____

c) The approximate bond angle in the molecule _____

Question 4
4 Points

The compound chromium(III) nitrate is a strong electrolyte. Write the reaction when chromium(III) nitrate is put into water:

_____ = _____

Question 5
9 Points

Give the formula for the precipitate that is formed when each of the following aqueous solutions are mixed. (If no precipitate is expected then write no precipitate)

1. Iron(III) bromide and sodium sulfide _____

2. Calcium chloride and ammonium iodide _____

3. Lead (II) nitrate and potassium chloride _____

Question 6
5 Points

Write the net ionic equation for the reaction that takes places when aqueous solutions of silver(I) nitrate and nickel(II) chloride are combined.

_____ = _____

Question 7
5 Points

Write the **net ionic equation** for the reaction that takes places when aqueous solutions of **hydrofluoric acid (HF)** and **ammonia (NH₃)** are combined.

_____ = _____

Question 8
5 Points

Write the **net ionic equation** for the reaction that takes places when solid **calcium carbonate** is added to **perchloric acid**.

_____ = _____

Question 9
5 Points

In the laboratory a student finds that it takes **21.7 Joules** to increase the temperature of **11.7 grams** of liquid mercury from **22.3** to **36.8** degrees Celsius.

Determine the **specific heat** of mercury.

For full credit you must show work.

_____ J/g.^oC

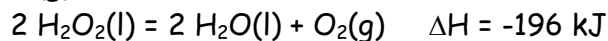
Question 10
5 Points

A sample of solid gold is heated with an electrical coil. If **29.4 Joules** of energy are added to a **15.0 gram** sample and the final temperature is **38.7°C**, what is the **initial temperature** of the gold? Heat capacity of gold, **0.129 J/g.°C**
For full credit you must show work.

_____ °C

Question 11
5 Points

The following thermochemical equation is for the reaction of **hydrogen peroxide(l)** to form **water(l)** and **oxygen(g)**.



How many **grams** of **H₂O₂(l)** would have to react to produce **30.4 kJ** of energy?
For full credit you must show work.

_____ g H₂O₂

Question 12
5 Points

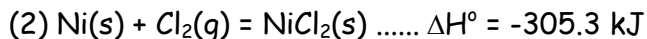
0.927 grams of benzoic acid is burned completely in a bomb calorimeter. The bomb is surrounded by **1.000 kg** of water. The temperature increases from **25.12** to **29.36** degrees Celsius. If the **heat capacity** of the bomb is **1.60 kJ/°C**, calculate the **heat of combustion** of the benzoic acid in **kJ/gram**. The specific heat of water is **4.184 J/g°C**.
Circle the best answer!

- 21.4 kJ/gram
- 26.5 kJ/gram
- 32.7 kJ/gram
- 18.9 kJ/gram
- 9.2 kJ/gram

Question 13

5 Points

Given the **standard enthalpy changes** for the following two reactions:



what is the **standard enthalpy change** for the reaction:



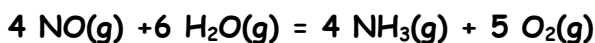
For full credit you must show work.

_____ kJ

Question 14

5 Points

Using standard **heats of formation** given, calculate the standard **enthalpy change** for the following reaction:



$[\Delta H_f^\circ: \text{NH}_3(g), -46 \text{ kJ/mol} \quad \text{NO}(g), 90 \text{ kJ/mol} \quad \text{H}_2\text{O}(g), -242 \text{ kJ/mol}]$

For full credit you must show work.

_____ kJ

Question 15

5 Points

In the laboratory you dilute **4.83 mL** of a concentrated **6.00 M hydriodic acid** solution to a total volume of **50.0 mL**. What is the concentration of the dilute solution?

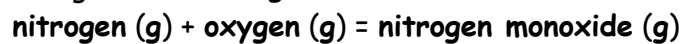
For full credit you must show work.

_____ M

Question 16

6 Points

For the following reaction, **6.64** grams of **nitrogen gas** are mixed with excess **oxygen gas**. The reaction yields **12.5** grams of **nitrogen monoxide**.



What is the **percent yield** for this reaction ?

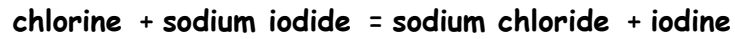
For full credit you must show work and include a balanced chemical equation.

_____ %

Question 17

6 Points

For the following reaction, **3.69** grams of **chlorine gas** are mixed with **6.56×10^{-2}** moles of **sodium iodide**.



What is the maximum amount of **iodine** that can be formed?

For full credit you must show work and include a balanced chemical equation.

_____ mol of iodine

Do Not Write Below This

Exam III Score