

The Periodic Table

IA H 1 1.01	The Periodic Table																VIII A He 2 4.00														
II A Li 3 6.94	II A Be 4 9.01											III A B 5 10.81	IV A C 6 12.01	V A N 7 14.01	VI A O 8 16.00	VII A F 9 19.00	VIII A Ne 10 20.18														
Na 11 22.99	Mg 12 24.31			III B	IV B	V B	VI B	VII B	VIII B	VIII B	VIII B	VIII B	IB	IIB	Al 13 26.98	Si 14 28.09	P 15 30.97	S 16 32.07	Cl 17 35.45	Ar 18 39.95											
K 19 39.10	Ca 20 40.08	Sc 21 44.96	Ti 22 47.88	V 23 50.94	Cr 24 52.00	Mn 25 54.94	Fe 26 55.85	Co 27 58.93	Ni 28 58.69	Cu 29 63.55	Zn 30 65.39	Ga 31 69.72	Ge 32 72.61	As 33 74.92	Se 34 78.96	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	Exceptions
Sodium (Na ⁺), potassium (K ⁺), and ammonium (NH ₄ ⁺) salts	
Nitrate (NO ₃ ⁻), acetate (CH ₃ CO ₂ ⁻), chlorate (ClO ₃ ⁻), and perchlorate (ClO ₄ ⁻) salts	
Chloride (Cl ⁻), bromide (Br ⁻), and iodide (I ⁻) salts	Pb ²⁺ , Ag ⁺ , Hg ₂ ²⁺
Fluoride (F ⁻) salts	Ca ²⁺ , Sr ²⁺ , Ba ²⁺ , Pb ²⁺
Sulfate (SO ₄ ²⁻) salts	Ca ²⁺ , Hg ₂ ²⁺ , Sr ²⁺ , Ba ²⁺ , Pb ²⁺

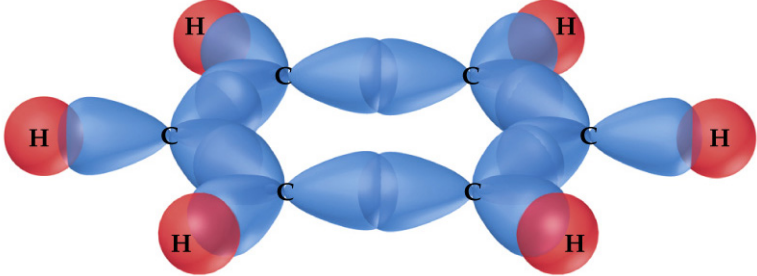
Insoluble Ionic Compounds	Exceptions
Hydroxide (OH ⁻) and oxide (O ²⁻) compounds	Na ⁺ , K ⁺ , Ba ²⁺
Sulfide (S ²⁻) salts	Na ⁺ , K ⁺ , NH ₄ ⁺ , Ba ²⁺
Carbonate (CO ₃ ²⁻) and phosphate (PO ₄ ³⁻) salts	Na ⁺ , K ⁺ , NH ₄ ⁺

SID

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Last _____

First _____

Question 1 8 Points	On the rough work paper provided draw the Lewis Dot Structures for the following molecules. Classify each as polar or nonpolar ?																					
	a) NO_3^- : _____ b) CO_2 : _____ c) CH_2Cl_2 : _____ d) PF_2Cl_3 : _____																					
Question 2 4 Points	In our discussion on the consequences of molecular polarity , the data shown below was used to discuss: <table border="1" data-bbox="289 527 672 863" style="display: inline-table; vertical-align: top; margin-right: 20px;"> <thead> <tr> <th colspan="3">Solubility of Some Common Substances</th> </tr> <tr> <th>Compound</th> <th colspan="2">Solubility in H_2O g/100mL</th> </tr> </thead> <tbody> <tr> <td>O_2</td> <td>4.5×10^{-3}</td> <td>18°C</td> </tr> <tr> <td>N_2</td> <td>2.0×10^{-3}</td> <td>18°C</td> </tr> <tr> <td>NH_3</td> <td>89.5</td> <td>0°C</td> </tr> <tr> <td>CO_2</td> <td>0.179</td> <td>18°C</td> </tr> <tr> <td>HCl</td> <td>72.1</td> <td>20°C</td> </tr> </tbody> </table> a) Membranes b) Micelle action c) Fabric softeners d) Like dissolves like e) Detergents	Solubility of Some Common Substances			Compound	Solubility in H_2O g/100mL		O_2	4.5×10^{-3}	18°C	N_2	2.0×10^{-3}	18°C	NH_3	89.5	0°C	CO_2	0.179	18°C	HCl	72.1	20°C
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Question 3 6 Points	A molecule has sp^3d hybridization with 3 lone pairs . <p>a) The electron pair geometry of this molecule is: _____</p> <p>b) The molecular geometry of this molecule is: _____</p> <p>c) Molecule will have an approximate bond angle(s) of: _____</p>																					
Question 4 8 Points	Depicted below is the sigma bonds benzene (C_6H_6) . <div style="text-align: center;">  </div> <p>a) The sigma bond formed between the carbon atoms is best described as being between the overlap of two _____ hybrid orbitals.</p> <p>b) The sigma bonds formed between the hydrogen and carbon is best described as being the overlap of an _____ hybrid orbital on each carbon with the _____ orbital on the hydrogen atoms.</p> <p>c) If the pi bonds were to be depicted one would see _____ pi bond(s).</p> <p>d) These pi bonds are formed by of overlap of the _____ orbital on each carbon.</p>																					

<p>Question 5 6 Points</p>	<p>Classify each of the compounds as soluble (s) or not soluble (ns):</p> <p>Magnesium acetate: _____ Sodium phosphate: _____ Barium sulfide: _____</p>
<p>Question 6 4 Points</p>	<p>Write a balanced chemical equation for the reaction that occurs when aqueous solutions of barium iodide and iron(III) sulfate are combined:</p> <p>_____ = _____</p>
<p>Question 7 4 Points</p>	<p>Write a net ionic equation for the reaction that occurs when aqueous solutions of potassium hydroxide and hydrosulfuric acid (H₂S) are combined.</p> <p>_____ = _____</p>
<p>Question 8 4 Points</p>	<p>Write a net ionic equation for the reaction that occurs when an aqueous solution of nitric acid is added to solid barium sulfite.</p> <p>_____ = _____</p>
<p>Question 9 6 Points</p>	<p>In the laboratory a student finds that it takes 23.8 Joules to increase the temperature of 13.5 grams of solid platinum from 22.6 to 36.6 degrees Celsius. Determine the heat capacity of the platinum the student measured?</p> <p style="text-align: right;"><u>For full credit you must show work.</u></p> <p style="text-align: right;">_____ J/g°C</p>
<p>Question 10 6 Points</p>	<p>A chunk of silver weighing 19.7 grams and originally at 97.48°C is dropped into an insulated cup containing 76.6 grams of water at 23.38°C. Assuming that all of the heat is transferred to the water, calculate the final temperature of the water.</p> <p>Heat Capacity : H₂O = 4.184 J/g°C Ag = 0.237 J/g°C</p> <p style="text-align: right;"><u>For full credit you must show work.</u></p> <p style="text-align: right;">_____ °C</p>

Question 11
4 Points

The reaction of carbon monoxide(g) with water(l) to form carbon dioxide(g) and hydrogen(g) proceeds as follows:



When **8.57 grams** of **CO(g)** react with sufficient **H₂O(l)**, **0.857 kJ** of energy are absorbed.. What is the value of ΔH for the reaction **per mole of CO(g)**?

For full credit you must show work.

kJ.mol⁻¹

Question 12
8 Points

When **0.32g** of **hydrazine (N₂H₄)** is burned in a bomb calorimeter containing **600g** of **water** the temperature of the water **increases** by **1.8°C**. Calculate the heat of combustion of hydrazine in J.mol⁻¹

Heat Capacities: H₂O = 4.184 J/g°C

Calorimeter = 420 J/°C

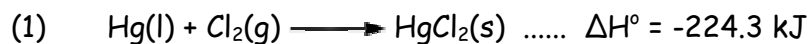
For full credit you must show work.

J.mol⁻¹

Question 13

4 Points

Given the standard enthalpy changes for the following two reactions:



what is the standard enthalpy change for the reaction:



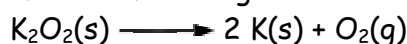
For full credit you must show work.

kJ

Question 14

4 Points

The **standard enthalpy change** for the following reaction is **496 kJ** at 298 K.



What is the **standard heat of formation** of $\text{K}_2\text{O}_2(\text{s})$?

$\text{kJ}\cdot\text{mol}^{-1}$

Question 15

4 Points

You need to make an aqueous solution of **0.127 M barium hydroxide** for an experiment in lab, using a **125 mL volumetric flask**. How much **solid barium hydroxide** should you add ?

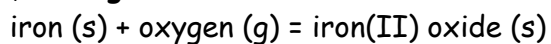
For full credit you must show work.

g

Question 16

6 Points

For the following reaction, **9.68 grams of iron** are mixed with **0.102 moles of oxygen gas**.



What is the **maximum amount of iron(II) oxide** (in moles) that can be formed?

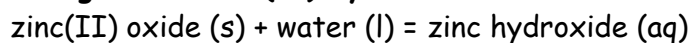
For full credit you must show work and give balanced chemical equation(s).

 mol**Question 17**

6 Points

For the following reaction, **3.43 grams of zinc(II) oxide** are mixed with **excess water**.

The reaction yields **3.24 grams of zinc(II) hydroxide**.



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

For full credit you must show work and give balanced chemical equation(s).

 %

Question 18
8 Points

If 15.0 mL of a 0.105 M barium hydroxide solution is required to neutralize 21.8 mL of hydroiodic acid, what is the molarity of the hydroiodic acid solution?

For full credit you must show work and give balanced chemical equation(s).

M

Do Not Write Below This

Exam III Score