

THE OHIO STATE
UNIVERSITY**CHEMISTRY 1220 – SPRING 2023****MIDTERM 3 – HELPFUL INFORMATION & SCRATCH PAPER****Instructions:**

- **DO NOT WRITE ON THIS BOOKLET UNTIL YOU HAVE BEGUN YOUR EXAM!**
- Stow away all personal items except your BuckID, pencil, eraser, and approved calculator.
- Prevent the appearance of academic misconduct by keeping your eyes on your own iPad and scratch paper, using only approved materials, and putting down your pencil when time is called.
- Do not detach pages of the scratch paper booklet. Nothing written on the scratch paper will be graded in any way.
- You must turn in your entire scratch paper booklet. Any portions of this scratch paper booklet removed from the classroom will be assumed to be Academic Misconduct and pursued as such.

The periodic table needed for the exam is listed below with supplemental information on the following page:

Periodic Table of the Elements																	
1A/1	2A/2											3A/13	4A/14	5A/15	6A/16	7A/17	8A/18
1 H 1.008																	2 He 4.003
3 Li 6.941	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.64	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57-71	72 Hf 178.5	73 Ta 180.9	74 W 183.8	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89-103	104 Rf (267)	105 Db (268)	106 Sg (269)	107 Bh (270)	108 Hs (277)	109 Mt (278)	110 Ds (281)	111 Rg (282)	112 Cn (285)	113 Nh (286)	114 Fl (289)	115 Mc (290)	116 Lv (293)	117 Ts (294)	118 Og (294)
Lanthanide series		57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173	71 Lu 175.0	
Actinide series		89 Ac (227)	90 Th 232.0	91 Pa 231.0	92 U 238.0	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 (266)	

STUDENT: Please sign below to acknowledge that you understand that any use of non-approved materials or devices, or the discussion of the contents of this exam (either verbal or written) with anyone other than your instructor is Academic Misconduct. Any violations or perceived violations will be submitted to the Committee on Academic Misconduct.

Signature _____

Date _____

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SUPPLEMENTAL INFORMATIONFundamental Constants/Conversion Factors/Relationships

Avogadro's Number	N_A	$= 6.022 \times 10^{23} / \text{mol}$
Gas Constant	R	$= 8.314 \text{ J/mol-K}$ $= 0.0821 \text{ L-atm/mol-K}$
Kelvin	K	$= ^\circ\text{C} + 273.15$
Fahrenheit to Celsius	$^\circ\text{C}$	$= \frac{5}{9} (^\circ\text{F} - 32)$
Pressure	1 atm	$= 760 \text{ mm Hg} = 760 \text{ torr} = 1.01325 \times 10^5 \text{ Pa}$
Ion-product constant of water at 25°C	K_w	$= 1.0 \times 10^{-14}$
Faraday Constant	$1 F$	$= 96,485 \text{ C/mol e}^-$
Joule to coulomb volts	1 J	$= 1 \text{ C-V}$

Equations

$$K_p = K_c(RT)^{\Delta n}$$

$$\text{Quadratic equation solution} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\% \text{ ionization} = \left(\frac{[\text{H}_3\text{O}^+]_{\text{eq}}}{[\text{HA}]_0} \right) * 100\%$$

$$\text{pH} = \text{p}K_a + \log \left(\frac{[\text{base}]}{[\text{acid}]} \right)$$

$$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$$

$$\Delta G^\circ = -RT \ln K$$

$$\Delta G = \Delta G^\circ + RT \ln Q$$

$$\Delta G^\circ = -nFE^\circ$$

$$\ln \left(\frac{K_2}{K_1} \right) = \frac{\Delta H^\circ}{R} \left(\frac{1}{T_1} - \frac{1}{T_2} \right)$$

$$E = E^\circ - \frac{0.0592 \text{ V}}{n} \log Q$$