

Name (Last, First):

PID:

Exam Classroom: _____

General Descriptive Chemistry 101 Exam I

DO NOT OPEN OR WRITE ANYTHING UNTIL INSTRUCTED TO DO SO

Instructions:

1. Write your name and PID above.
2. Write your PID at the top of each page.
3. Read each question carefully.
4. Multiple-choice/many-select questions can be answered in pencil.
5. For many-select questions, mark "x" in boxes (please no stray marks).
6. All other questions must be written in pen. **ANSWERS MUST BE PLACED IN BOXES or LINES** (including CORRECT UNITS and sig figs).
7. **SHOW YOUR WORK** with correct units and sig figs. Partial credit based on work shown.
8. Use the periodic table.
9. Double-check your calculations.
10. Do not leave any answers blank.
11. **Read and sign the honor pledge when, and only when, you finish taking the exam.**
12. **As part of the Honor Code, you may not discuss the contents of this exam with peers until it is returned to you.**
13. Return *all* pages when you complete the exam.
14. Relax. You've got this.

Honor Pledge: By signing below, I pledge that I have not violated the UNC Honor Code by receiving or giving unauthorized assistance on this exam. If I do not sign, then I acknowledge that I was not honorable in taking the exam and understand that it will simply not be graded, no questions asked.

(Signature)

101A

1A 1	2A 2	Periodic Table of the Elements										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	3B 3	4B 4	5B 5	6B 6	7B 7	8B 8	9 9	10 10	1B 11	2B 12	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 98.00	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 209.0	85 At 210.0	86 Rn 222.0
87 Fr 223.0	88 Ra 226.0	89 - 103	104 Rf 261.1	105 Db 262.1	106 Sg 266.1	107 Bh 264.1	108 Hs 269.1	109 Mt 268.1	110 Ds 281	111 Rg 272	112 Cn 285	113 Nh 286	114 Fl 289	115 Mc 289	116 Lv 293	117 Ts 294	118 Og 294
		57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm 145.0	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 173.0	71 Lu 175.0	
		89 Ac 227.0	90 Th 232.0	91 Pa 231.0	92 U 238.0	93 Np 237.1	94 Pu 244.1	95 Am 243.1	96 Cm 247.1	97 Bk 247.1	98 Cf 251.1	99 Es 252.1	100 Fm 257.1	101 Md 258.1	102 No 259.1	103 Lr 262.1	

Designed by
Chris Davis &
Todd Azevedo

$$1 \text{ mL} = 1 \text{ cm}^3$$

$$1 \text{ \AA} = 10^{-10} \text{ m}$$

$$1.661 \times 10^{-24} \text{ g} = 1.000 \text{ amu}$$

$$1.000 \text{ mol} = 6.022 \times 10^{23} \text{ particles}$$

$$T(\text{Kelvin}) = T(^{\circ}\text{C}) + 273.15$$

$$\text{Density of water at } 25^{\circ}\text{C} = 1.00 \text{ g/mL}$$

$$c = 2.998 \times 10^8 \text{ m/s}$$

$$c = \lambda\nu$$

$$1 \text{ Hz} = 1 \text{ s}^{-1} = 1/\text{s}$$

$$h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$$

$$E = h\nu$$

$$\lambda = \frac{h}{m\nu}$$

$$\Delta E = -hcR_{\text{H}} \left(\frac{1}{n_{\text{f}}^2} - \frac{1}{n_{\text{i}}^2} \right) \text{ where } hcR_{\text{H}} = 2.18 \times 10^{-18} \text{ J}$$

$$E_{\text{el}} = \frac{\kappa Q^+ Q^-}{d}$$

$$1 \text{ joule} = 1 \text{ kg m}^2/\text{s}^2$$

$$R = 0.08206 \text{ L atm/mol K} = 8.314 \text{ J/mol K}$$

$$1 \text{ atm} = 760 \text{ torr} = 760 \text{ mm Hg} = 1.01325 \text{ bar} = 101.325 \text{ kPa}$$

$$PV = nRT$$

$$\frac{\text{rate}_1}{\text{rate}_2} = \sqrt{\frac{\mathcal{M}_2}{\mathcal{M}_1}}$$

$$P_i = X_i P_{\text{total}}$$

$$\left[P + a \left(\frac{n^2}{V^2} \right) \right] (V - nb) = nRT$$

Multiple-choice (5 pts each): Fill in the circle beside your final answer. No stray marks, please.

1. Which one of the following describes the most stable configuration?

O A)	<input type="radio"/> +1	<input type="radio"/> +1
O B)	<input type="radio"/> +1	<input type="radio"/> +1
O C)	<input type="radio"/> +1	<input type="radio"/> -1
O D)	<input type="radio"/>	<input type="radio"/>

2. You wish to report the sum of the following three values: 117 cg, 6.1043 g, 0.1943 kg. What is the correct number of significant figures in your answer?

- O A) 3
 O B) 4
 O C) 5
 O D) 6

3. The Alien Telescope Array in northern California seeks to record signals sent by extraterrestrials. The Telescope Array can measure signals ranging from 1000 to 15000 MHz. What is the longest wavelength these instruments can record?

- O A) 0.3 m
 O B) 0.3 Gm
 O C) 2 cm
 O D) 20 km

4. The period at the end of this sentence has an area of approximately 0.2 mm^2 . One carbon atom, with a diameter of about 160 pm, covers an area of about 0.02 nm^2 . How many carbon atoms would be required to produce a layer that is one atom deep and covers 0.2 mm^2 ?

- O A) 1×10^{12} atoms
 O B) 2×10^6 atoms
 O C) 1×10^7 atoms
 O D) 1×10^{13} atoms