

Al al-Bayt University



Chem 101; 1<sup>st</sup> Exam

Name:

S. No.:

Dr:

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Exam consists of 13 questions (26 points total)

Answer all questions

Time allowed is one hour only

Answer Form

Question No.	Answer
1	
2	
3	
4	
5	
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7	
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11	
12	
13	
Total Score	/26

\*\*Good Luck\*

1. A term that relates to how well a particular measurement is able to be repeated by a measuring device is:

- a) qualitative
- b) precision
- c) phase
- d) accuracy
- e) quantitative

2. Do the following calculations  $[155.3 + 2.53 \times 4.8]$  and give the proper significant figures:

- a) 167
- b) 167.4
- c) 167.44
- d) 167.444
- e) 167.0

3. Which of the following atoms is the smallest?

- a) As
- b) Ge
- c) P
- d) Se
- e) S

4. The formula for aluminum nitride is:

- a)  $\text{Al}_3\text{N}_4$
- b)  $\text{Al}_4\text{N}_3$
- c)  $\text{Al}_2\text{N}_3$
- d)  $\text{AlN}$
- e)  $\text{Al}_3\text{N}_2$

5. A compound is composed of 68.4% Cr (At. Mass = 52.0) and 31.6% O (atomic mass = 16.0). What is the empirical formula of the compound?

- a)  $\text{Cr}_2\text{O}_3$
- b)  $\text{CrO}_2$
- c)  $\text{Cr}_2\text{O}_5$
- d)  $\text{Cr}_3\text{O}_2$
- e)  $\text{Cr}_3\text{O}_4$

6. The electronic configuration for  $\text{Cu}^+$  ion (Cu; atomic number 29) is:

- a)  $[\text{Ar}]3d^94s^1$
- b)  $[\text{Ar}]3d^84s^2$
- c)  $[\text{Ar}]3d^{10}4s^0$
- d)  $1s^22s^22p^63s^23p^64s^13d^9$
- e)  $1s^22s^22p^63s^23p^64s^23d^8$

7. The wavelength (in nm) associated with a photon energy of  $4.36 \times 10^{-18}$  Joules is:

- a) 362 nm
- b) 1.83 nm
- c) 127 nm
- d) 45.6 nm
- e) 21.6 nm

8. For the electron transition from the  $n = 2$  to the  $n = 4$  quantum state in Bohr's model of the hydrogen atom. What is the wavelength (in nm) of the associated photon?

- a) 409
- b) 617
- c) 486
- d) 325
- e) 233

9. Which of the following is not an allowed set of quantum numbers for an electron in an atom?

- a)  $n = 3, l = 3, m_l = -2, m_s = \frac{1}{2}$
- b)  $n = 4, l = 3, m_l = -3, m_s = \frac{1}{2}$
- c)  $n = 2, l = 0, m_l = 0, m_s = -\frac{1}{2}$
- d)  $n = 3, l = 2, m_l = -1, m_s = \frac{1}{2}$
- e)  $n = 3, l = 0, m_l = 0, m_s = \frac{1}{2}$

10. Calculate the percentage yield of  $\text{CH}_3\text{OH}$  when 68.5 kg  $\text{CO}$  is reacted with 8.60 kg  $\text{H}_2$  to yield  $3.57 \times 10^4$  g of  $\text{CH}_3\text{OH}$ , in the reaction  $2\text{H}_2(\text{g}) + \text{CO}(\text{g}) \longrightarrow \text{CH}_3\text{OH}(\text{l})$ ?

- a) 34.2 %
- b) 55.1%
- c) 52.0%
- d) 32.7%
- e) 66.0%

11. The number of protons, neutrons, and electrons in  $^{23}\text{X}^+$  (atomic number = 11) is?

- a) 11, 12, and 10
- b) 11, 12, and 11
- c) 10, 12, and 11
- d) 11, 10, and 12
- e) 12, 10, and 11

12. What is the percentage of nitrogen by mass in ammonium nitrate ( $\text{NH}_4\text{NO}_3$ )? (atomic masses:  $\text{H} = 1.10$ ;  $\text{N} = 14.01$ ;  $\text{O} = 16$ )

- a) 43.8%
- b) 35.4%
- c) 17.5%
- d) 42.9%
- e) 35.0%

13. What is the designation for the electron subshell with principle quantum number = 4 and azimuthal quantum number = 3; the number of orbitals in this subshell; and the total electrons it can hold:

- a) 3d; 5 orbitals; 10 electrons
- b) 3s; 1 orbital; 2 electrons
- c) 3p; 3 orbitals; 6 electrons
- d) 4f; 7 orbitals; 14 electrons
- e) 4p; 3 orbitals; 6 electrons

Constants, etc.

c (speed of light) =  $3 \times 10^8$  m/s

h (Planck's constant) =  $6.63 \times 10^{-34}$  Js

$R_H$  (Rydberg constant) =  $2.18 \times 10^{-18}$  J

(Note: this is also known as 'A' or Bohr's constant relating electron energies in the Hydrogen atom)

Mass of electron:  $9.11 \times 10^{-31}$  kg

1 Joule =  $1 \text{ kg m}^2 \text{ s}^{-2}$

Periodic Table

																		15				
																		2				
1																	10					
1	H																	He				
	1.008																	4.003				
2																						
2	Li	Be															B	C	N	O	F	Ne
	6.941	9.012															10.81	12.01	14.01	16.00	19.00	20.18
3																						
3	Na	Mg											Al	Si	P	S	Cl	Ar				
	22.99	24.31											26.98	28.09	30.97	32.07	35.45	39.95				
4																						
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr				
	39.10	40.08	44.96	47.88	50.94	52.00	54.94	55.85	58.93	58.69	63.55	65.39	69.72	72.61	74.92	78.96	79.90	83.80				
5																						
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe				
	85.47	87.62	88.91	91.22	92.91	95.94	98.91	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3				
6																						
6	Cs	Ba	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn				
	132.9	137.3	175.0	178.5	180.9	183.8	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	209.0	210.0	222.0				
7																						
7	Fr	Ra	Lr	Rf	Db	Sg	Bh	Hs	Mt	Uun	Uuu	Uub		Uuq		Uuh		Uuo				
	223.0	226.0	262.1	261.1	262.1	263.1	264.1	265.1	268	269	272	277		289		289		293				
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