Dr. Zellmer | Chemistry 1210 | All Sections
Time: 7 PM Sun. | Autumn Semester 2022 | October 30, 2022
30 min | Quiz VIII

Name _____ Rec. TA/time _____

Show **ALL** your work or **EXPLAIN** to receive full credit.

1. (6 pts) Al_2O_3 reacts with hydrochloric acid. Complete and balance the reaction (include state symbols).

2. (6 pts) Potassium reacts with water. Complete and balance the reaction (include state symbols).

3. (3 pts) Consider the valence electron configuration of ns^2np^5 and the following statements. Which of the statements are **true**?

   1. Elements with this electron configuration form -1 anions.
   2. Elements with this electron configuration are expected to have large positive electron affinities.
   3. Elements with this electron configuration are nonmetals.
   4. Elements with this configuration form acidic oxides.

4. (3 pts) Which of the following has the **intermediate** (middle) value when the five elements listed are arranged in order of **increasing nonmetallic** character?

a) Pb(82) b) As(33) c) Br(35) d) Sb(51) e) Se(34)

5. (3 pts) Which of the following statements is **INCORRECT**?

a) $_{37}$Rb is **more metallic** than $_{19}$K .

b) The **electron affinity** of $_{56}$Ba is **less negative** than that for $_{52}$Te.

c) The **radius** of $_{33}$As is **smaller** than that of $_{31}$Ga.

d) The ionic **radius** of P^{3-} is **smaller** than that of Ca^{2+}.

e) $_{55}$Cs forms a **cation more easily** than $_{56}$Ba does.

6. (2 pts) Which of the following are basic oxides or acidic oxides? Why?

SO_3 CaO Al_2O_3 CO_2

7. (2 pts) Identify the following as ionic or molecular.

$PbCl_2$ TeH_2 Fe_2O_3 SO_2

8. (5 pts) Show the relationship between lattice energy (LE), charge and distance between the charges and use it to explain which compound in each pair should have the greater LE.

a) show the equation for lattice energy, LE.

b) $FeBr_3$ or $FeBr_2$

c) CaO or MgO

9. (3 pts) Which of the following bonds has the largest dipole moment?

a) H—C b) H—O c) H—Cl d) H—N e) O—F

10. (3 pts) Which of the following compounds would you expect to be ionic?

1) SF_6 2) H_2O_2 3) FeF_3 4) PbF_2 5) SO_3

11. If the electronegativity difference between elements A and X is **1.0**, the bond in AX will most likely be

a) ionic b) polar covalent c) nonpolar pure covalent

12. (3 pts) The dipole moment of ClF(g) is 0.88 D. The bond length is 1.63 Å. (**Show work and explain!**) What magnitude of the effective charge (i.e. the partial charge), in units of *e*, on the Cl and F atoms leads to this dipole moment?

USEFUL INFORMATION

1 amu = 1.66×10^{-24} g

Avogadro's number, N_A, = 6.02×10^{23} particles/mole

1 Å = 10^{-10} m

electron charge, e = 1.602×10^{-19} C 1 D = 3.34×10^{-30} C•m $\mu = Q \bullet r$

	IA	IIA	IIIB	IVB	VB	VIB	VIIB	VIIIB			IB	IIB	IIIA	IVA	VA	VIA	VIIA	VIIIA
1	1.008 **H** 1																	4.003 **He** 2
2	6.941 **Li** 3	9.012 **Be** 4											10.811 **B** 5	12.011 **C** 6	14.007 **N** 7	15.999 **O** 8	18.998 **F** 9	20.179 **Ne** 10
3	22.990 **Na** 11	24.305 **Mg** 12											26.98 **Al** 13	28.09 **Si** 14	30.974 **P** 15	32.06 **S** 16	35.453 **Cl** 17	39.948 **Ar** 18
4	39.098 **K** 19	40.08 **Ca** 20	44.96 **Sc** 21	47.88 **Ti** 22	50.94 **V** 23	52.00 **Cr** 24	54.94 **Mn** 25	55.85 **Fe** 26	58.93 **Co** 27	58.69 **Ni** 28	63.546 **Cu** 29	65.38 **Zn** 30	69.72 **Ga** 31	72.59 **Ge** 32	74.92 **As** 33	78.96 **Se** 34	79.904 **Br** 35	83.80 **Kr** 36
5	85.47 **Rb** 37	87.62 **Sr** 38	88.91 **Y** 39	91.22 **Zr** 40	92.91 **Nb** 41	95.94 **Mo** 42	98 **Tc** 43	101.07 **Ru** 44	102.91 **Rh** 45	106.42 **Pd** 46	107.87 **Ag** 47	112.41 **Cd** 48	114.82 **In** 49	118.69 **Sn** 50	121.75 **Sb** 51	127.60 **Te** 52	126.90 **I** 53	131.39 **Xe** 54
6	132.91 **Cs** 55	137.33 **Ba** 56	138.91 **La** 57	178.39 **Hf** 72	180.95 **Ta** 73	183.85 **W** 74	186.21 **Re** 75	190.23 **Os** 76	192.22 **Ir** 77	195.08 **Pt** 78	196.97 **Au** 79	200.59 **Hg** 80	204.38 **Tl** 81	207.2 **Pb** 82	208.98 **Bi** 83	209 **Po** 84	210 **At** 85	222 **Rn** 86
7	223 **Fr** 87	226.03 **Ra** 88	227.03 **Ac** 89	261 **Rf** 104	262 **Ha** 105	263 **Sg** 106	262 **Ns** 107	265 **Hs** 108	266 **Mt** 109	269 110	272 111	277 112						

Lanthanide Series	140.12 **Ce** 58	140.91 **Pr** 59	144.24 **Nd** 60	145 **Pm** 61	150.36 **Sm** 62	151.96 **Eu** 63	157.25 **Gd** 64	158.93 **Tb** 65	162.50 **Dy** 66	164.93 **Ho** 67	167.26 **Er** 68	168.93 **Tm** 69	173.04 **Yb** 70	173.04 **Lu** 71
Actinide Series	232.04 **Th** 90	231.04 **Pa** 91	238.03 **U** 92	237.05 **Np** 93	**Pu** 94	**Am** 95	**Cm** 96	**Bk** 97	**Cf** 98	**Es** 99	**Fm** 100	**Md** 101	**No** 102	**Lr** 103

A PERIODIC CHART OF THE ELEMENTS
(Based on ^{12}C)