

7

- ① Write the outer valence of Ca^{2+} and Br^- .
- ② Write the chemical formula
 - aluminum nitrate
 - lead (III) permanganate
 - zinc chromate
 - silver hydroxide
- ③ Arrange the following atoms in order of increasing reactivity:
 - Rb, Li, Na, K

Hint: reactivity trends with I.E.

- ④ Which element is more reactive?
 - Ca or Na

- ⑤ The radius of the atom is determined by
 - Z_{eff} and core e^-
 - # protons and Z_{eff}
 - Z_{eff} and valence e^-
 - # protons and core
- ⑥ Select the OD that violates Hund's Rule:

1s	↑↓	↑	↑	↑
2s	↑↓	↑↓	↑↓	↑↓
2p	↑↓	↑↓	↑↓	↑↓
3s	↑↓	↑↓	↑↓	↑↓
3p	↑↓	↑↓	↑↓	↑↓
3d	↑↓	↑↓	↑↓	↑↓

- ⑩ Select the smallest atom:
 - Bi, Sb, As, P, N
- ⑪ Which pair of elements is closest in size?
 - Cu, Ga, Se, Ge
- ⑫ From which element is it easiest to remove an e^- ?
 - S or Te

- ⑮ Select the atom with 2 single e^- in its highest occupied energy level:
 - Mg, O, N, F
- ⑯ Select the group of atoms with a radius most nearly the same:
 - Be, C, O, N
 - Ne, Ar, Kr, Xe
 - Mg, Ca, Sr, Ba
 - C, P, Se, I
 - C, Mn, Fe, Co

- ⑳ Name
 - Cu_2PO_4
 - $\text{Fe}(\text{NO}_2)_2$
 - $\text{Cr}_2(\text{CO}_4)_3$
 - $\text{Co}(\text{IO}_2)_2$
- ㉑ Why is the I.E. of K^+ greater than K ? You must calc. Z_{eff} and use Z_{eff} in your answer.
- ㉒ Use arrows and words to rank the following ions in decreasing size:
 - F^- , O^{2-} , N^{3-}
- ㉓ Calc neutrons in ^{51}V .

- ㉔ Atoms of X have EC equivl to $1s^2 2s^2 2p^6 3s^2 3p^3$. The compound formed with Mg is: Mg_3X_2 , Mg_2X , MgX_2 , MgX_3 , Mg_3X_3
- ㉕ Which element has a valence of $3e^-$?
 - Si, Ca, Ga, Sb, Br
- ㉖ Write chemical formula
 - calcium permanganate
 - iron (II) oxide
 - ammonium dichromate
 - platinum (III) bromide
- ㉗ The Z_{eff} of Na outer e^- is different than the Z_{eff} of Ne outer e^- . This difference accounts for which of the following:
 - Na has greater density
 - Na has lower first I.E.
 - Na has a higher mp
 - Na has fewer isotopes

Chem 8 WB PreComp Review

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1s $\uparrow\downarrow$	2s $\uparrow\downarrow$	2p $\uparrow\downarrow$	3s $\uparrow\downarrow$	3p $\uparrow\downarrow$
1s $\uparrow\downarrow$	2s $\uparrow\downarrow$	2p $\uparrow\downarrow$	3s $\uparrow\downarrow$	3p $\uparrow\downarrow$
1s $\uparrow\downarrow$	2s $\uparrow\downarrow$	2p $\uparrow\downarrow$	3s $\uparrow\downarrow$	3p $\uparrow\downarrow$
1s $\uparrow\downarrow$	2s $\uparrow\downarrow$	2p $\uparrow\downarrow$	3s $\uparrow\downarrow$	3p $\uparrow\downarrow$
- ⑦ Select the atom with highest EA on valence e^- :
 - Al, P, S, Si, Cl, Ar
- ⑧ Select the atom with lowest EA on valence e^- :
 - Ca, Mn, Sc, Ti, Fe, Zn
- ⑨ Select the element with highest EA on valence I.E., Cl, F, Br
- ⑩ Select the smallest atom:
 - Bi, Sb, As, P, N
- ⑪ Which pair of elements is closest in size?
 - Ca, Ga, Se, Ge
- ⑫ From which element is it easiest to remove an e^- ?
 - S or Te
- ⑬ Why does it require more I.E. to remove an e^- from the $n=2$ of Al than Mg?
 - calculation Z_{eff} required
- ⑭ A powdered metal reacts with a colorless soln and a gas is given off. A flaming splint ignites the gas. The gas is _____.
 - ⑮ Select the atom with 2 single e^- in its highest occupied energy level:
 - Mg, O, N, F
 Hint: write the OD
 - ⑯ Select the group of atoms with a radius most nearly the same:
 - Be, C, O, Ne
 - Ne, Ar, Kr, Xe
 - Mg, Ca, Sr, Ba
 - C, P, Se, I
 - C, Mn, Fe, Co
 - ⑰ Write the EC for Mn^{+3}
 - ⑱ Select the pair of elements that has the smallest difference in size:
 - Ca, Kr, K, Ni, Ge
 - ⑲ P contains _____ electrons.
 - ⑳ Name
 - Cu_3PO_4
 - $\text{Fe}(\text{NO}_3)_2$
 - $\text{Cr}_2(\text{SO}_4)_3$
 - $\text{Co}(\text{OH})_2$
 - ㉑ Why is the I.E. of X^+ greater than X ? You must calc. Z_{eff} and use Z_{eff} in your answer.
 - ㉒ Use arrows and words to rank the following ions in decreasing size:
 - F^- , O^{2-} , N^{3-}
 - ㉓ Calc neutrons in ^{23}V .
 - ㉔ An e^- drops from $n=7$ to $n=5$. The light released is a _____ line spectrum. continuous spectrum
 - ㉕ Atoms of X have EC equal to: $1s^2 2s^2 2p^6 3s^2 3p^3$. The compound formed with Mg is: Mg_3X_2 , Mg_2X , MgX_2 , MgX_3 , Mg_3X_2
 - ㉖ Which element has a valence of $3e^-$?
 - S, Ca, Ga, Sb, Br
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 - iron (II) oxide
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 - ㉘ The Z_{eff} of Na outer e^- is different than the Z_{eff} of K outer e^- . This difference accounts for which of the following:
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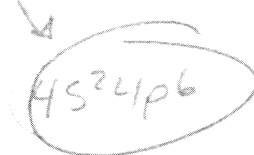
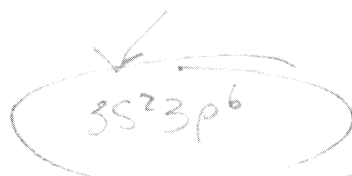
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⑤ When calcium and bromine react, they form an ionic compound.

① write the symbol for each ion that forms: Ca^{+2} Br^-

② what is the chem. formula: CaCl_2

③ ECV for Ca^{+2} and Br^-



④ name: calcium bromide

1 Formula

2 aluminum nitrate $\text{Al}(\text{NO}_3)_3$

3 lead (IV) permanganate $\text{Pb}(\text{MnO}_4)_4$

zinc chromate ZnCrO_4

vanadium (II) phosphate $\text{V}_3(\text{PO}_4)_2$

silver hydroxide AgOH

copper (II) acetate $\text{Cu}(\text{C}_2\text{H}_3\text{O}_2)_2$

Rb, Li, Na, K Rb > K > Na > Li
most least

~~L-1016-18-19~~

4 Which atom was more reactive?
Ca or Na

#protons vs Z_{eff}

Z_{eff} vs valence

$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$

7 which of the following elements has
higher attractive forces on the valence
 e^- ? Al, P, S, Si, Cl, Ar

8 which of the following elements
has lower attractive forces on
its valence e^- ? Cr, Mn, Sc, Ti, Fe, Zn

9 which of the following elements has
higher attractive forces on the
outer e^- ? F, I, Cl, Br

10 which of the following elements is
most electronegative? Bi, Sb, As, P, N

Which pair of elements is closest in size?

- H₂O
- CO₂
- CO
- I₂
- CH₂CH₃
- CH₂CH₂
- CH₃CH₃
- Cl₂
- CH₄
- PCl₃
- SiCl₄
- O₃

- H₂S
- PBr₃
- SiCl₄
- CHCl₃
- CH₃CH₃
- CH₂CH₂
- N₂
- O₂
- I₂

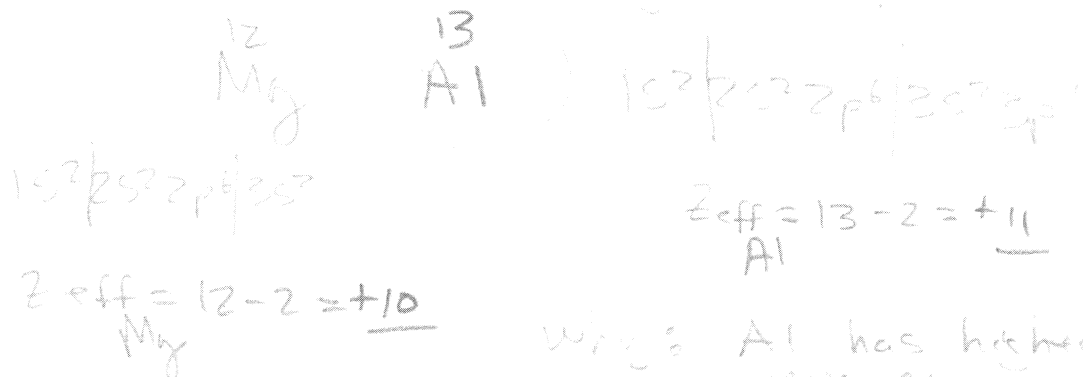
Which pair of elements is closest in size?

- Cu, Ga, Se, Ge
- Go, Ge
- Cu, Se

From which element is it easiest to remove an electron?

- S
- Te

13 Which element, Mg or Al, requires more ionization energy to remove an e^- from the $n=2$ energy level?



14 Calculate the Z_{eff} of the $n=2$ electrons of Mg and Al

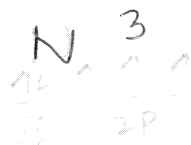
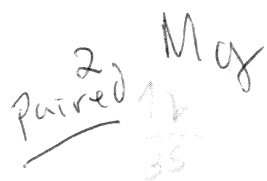
Mg = +10

Al = +11

15

A powdered metal is heated until it is colorless. The substance is then placed in a vacuum flask. A flowing stream of gas is instilled into tube and gas ignites. The gas is hydrogen.

16 How many $n=2$ single electrons are in the highest occupied energy level?



~~18~~ ~~19~~ ~~20~~ ~~21~~ ~~22~~ 16

which group of elements have the a radius most nearly the same?

- a. Be, B, C, N
- b. Ne, Ar, Kr, Xe
- c. Mg, Ca, Sr, Ba
- d. C, P, Se, I
- e. Cr, Mn, Fe, Co

~~18~~ ~~19~~ ~~20~~ ~~21~~ ~~22~~

Which of the correct EC for the following elements?

17

N^{-3} $1s^2 2s^2 2p^6$

Na^+ $1s^2 2s^2 2p^6$

Mn $1s^2 2s^2 2p^6 3s^2 3p^4 4s^2 3d^5$

Mn^{+3} $1s^2 2s^2 2p^6 3s^2 3p^6 3d^4$

~~17~~ ~~18~~ ~~19~~ ~~20~~ ~~21~~

Find the pair of elements that has the smallest difference in size.

~~17~~ ~~18~~ ~~19~~ ~~20~~ ~~21~~
Co, Kr, K, Ni, Ge 18

Co, Ni

~~25~~ ~~26~~ ~~27~~ ~~28~~ ~~29~~ ~~30~~ ~~31~~ 19

~~1~~ ~~2~~ ~~3~~ ~~4~~ ~~5~~ ~~6~~ ~~7~~ ~~8~~ ~~9~~ ~~10~~ ~~11~~ ~~12~~ ~~13~~ ~~14~~ ~~15~~ ~~16~~ ~~17~~ ~~18~~ ~~19~~ ~~20~~ ~~21~~ ~~22~~ ~~23~~ ~~24~~ ~~25~~ ~~26~~ ~~27~~ ~~28~~ ~~29~~ ~~30~~ ~~31~~ ~~32~~ ~~33~~ ~~34~~ ~~35~~ ~~36~~ ~~37~~ ~~38~~ ~~39~~ ~~40~~ ~~41~~ ~~42~~ ~~43~~ ~~44~~ ~~45~~ ~~46~~ ~~47~~ ~~48~~ ~~49~~ ~~50~~ ~~51~~ ~~52~~ ~~53~~ ~~54~~ ~~55~~ ~~56~~ ~~57~~ ~~58~~ ~~59~~ ~~60~~ ~~61~~ ~~62~~ ~~63~~ ~~64~~ ~~65~~ ~~66~~ ~~67~~ ~~68~~ ~~69~~ ~~70~~ ~~71~~ ~~72~~ ~~73~~ ~~74~~ ~~75~~ ~~76~~ ~~77~~ ~~78~~ ~~79~~ ~~80~~ ~~81~~ ~~82~~ ~~83~~ ~~84~~ ~~85~~ ~~86~~ ~~87~~ ~~88~~ ~~89~~ ~~90~~ ~~91~~ ~~92~~ ~~93~~ ~~94~~ ~~95~~ ~~96~~ ~~97~~ ~~98~~ ~~99~~ ~~100~~ ~~101~~ ~~102~~ ~~103~~ ~~104~~ ~~105~~ ~~106~~ ~~107~~ ~~108~~ ~~109~~ ~~110~~ ~~111~~ ~~112~~ ~~113~~ ~~114~~ ~~115~~ ~~116~~ ~~117~~ ~~118~~ ~~119~~ ~~120~~ ~~121~~ ~~122~~ ~~123~~ ~~124~~ ~~125~~ ~~126~~ ~~127~~ ~~128~~ ~~129~~ ~~130~~ ~~131~~ ~~132~~ ~~133~~ ~~134~~ ~~135~~ ~~136~~ ~~137~~ ~~138~~ 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1 ~~2~~ ~~3~~ ~~4~~ ~~5~~ 20

1. SrCO_3 = strontium carbonate

2. Cu_2PO_4 = copper (I) phosphate

3. $\text{Fe}(\text{MnO}_4)_2$ = iron (II) permanganate

4. $\text{Cr}_2(\text{C}_2\text{O}_4)_3$ = chromium (III) oxalate

5. $\text{Co}(\text{ClO}_2)_2$ = cobalt (II) chlorite

6. Na_2O_2 = sodium oxide, sodium peroxide

7. NaCN = sodium cyanide

8. rubidium nitrite = RbNO_2

9. beryllium dihydrogen phosphate = $\text{Be}^{+2} \text{PO}_4^{-3} = \text{Be}(\text{H}_2\text{PO}_4)_2$
 $\text{Be}_3(\text{PO}_4)_2$

10. $(\text{NH}_4)_3\text{PO}_4$ = ammonium phosphate

11. $\text{Ca}(\text{HSO}_4)_2$ = calcium hydrogen sulfate

12. $\text{Al}_2(\text{PO}_4)_3$ = aluminum phosphate

13. $\text{Ba}(\text{HCO}_3)_2$ = barium hydrogen carbonate
barium bicarbonate

14. CsMnO_4 = cesium permanganate

15. $\text{Hg}(\text{OH})_2$ = mercury (II) hydroxide

16. $\text{Pb}_3(\text{PO}_4)_2$ = lead (II) phosphate

21 why is the ionization energy of K^+ greater than K ? (calculation using Z_{eff} is required with why statement, 15% for 20pts)

Higher Z_{eff} K^+ $Z_{eff} K = +1$ $Z_{eff} K^+ \rightarrow$
 $Z_{eff} = 19 - 10 = +9$
 $+9 > +1$ so K^+ harder to remove e^- .

22 using arrows and words rank the following anions in decreasing size left to right.

F^- , O^{2-} , N^{3-}

big $\rightarrow$ small
 $N^{3-} > O^{2-} > F^-$

23 Calc neutrons in $^{28}_{23}V$

28n

24

An electron drops from $n=7$ to $n=5$.

The light released is _____.

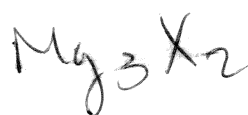
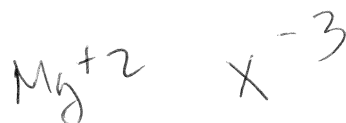
line spectrum continuous spectrum

~~18~~ ~~22~~ ~~25~~ ~~25~~ 25

Given $1s^2 2s^2 2p^6 3s^2 3p^3$

Atoms of element X, have the EC

above. The compound most likely formed with magnesium, Mg, is



~~18~~ 18

Write the correct formula for

the following names;

magnesium carbonate MgCO₃

titanium(IV) carbonate Ti(CO₃)₂

~~iron(III) oxide Fe₂O₃~~ ~~bromic acid HBrO₃~~

iron(III) oxide Fe₂O₃

bromic acid HBrO₃

iron(III) sulfide FeS₂

carbonic acid H₂CO₃

periodic acid HIO₄

26

Which element has a valence of $3e^-$?

Sc, Ca, ~~Ga~~, Sb, Br

~~13~~ name ~~27~~ ~~27~~ 27

$\text{Ca}(\text{MnO}_4)_2$ calcium permanganate

FeO iron (II) oxide

$(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ ammonium dichromate

PtBr_3 Platinum (III) bromide

NH_4NO_3 ammonium nitrate

LiCl lithium chloride

AuPO_4 gold (III) phosphate

BaBr_2 barium bromide

$\text{Be}(\text{OH})_2$ beryllium hydroxide

~~11~~ Calculate the total e^- 's.

~~4~~
 Na^+ , Cr^{+3} , Se^{+3} , Fe^{+2} , Fe^{+3}
10, 21, 18, 24, 23

Cl^- , S^{-2} , N^{-3} , P^{-3}
18, 18, 10, 18

26

Eff nuc charge of Na outer e^- is different than the Z_{eff} exp. by Ne outermost e^- . The diff best accounts for which of the following?

Na has greater density

Na has lower 1st ionization

Na has higher mp

Na has higher neutron-to-proton ratio than Ne

Na has fewer naturally occurring isotopes than Ne

24 According to VSEPR, the progressive decrease in bond angles in the series:

CH_4 , NH_3 , H_2O is best accounted for by: increasing unshared pairs e^-