Ionic bonding involes a metal and a nonmetal

$-$ $+$ $-$

transferring e^-s

(salts)

Na^{+1} Cl^{-1}

NaCl

Sodium chloride

Ca^{+2} Cl^{-1}

Cl^{-1}

$CaCl_2$

Calcium chloride

Al^{+3} Cl^{-1} Cl^{-1} Cl^{-1}

$AlCl_3$

@luminum chloride

Al^{+3} S^{-2}

Al^{+3} S^{-2}

S^{-2}

$-+6 \quad -6 = 0$

Al_2S_3

aluminum sulfide

$Mg \quad O$

$Mg^{+2} \quad O^{-2}$

MgO

magnesium oxide

1. p 35 e 36 n 45

2 $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^3$

$[Ar]\ 4s^2\ 3d^{10}\ 4p^3$

Mg^{+2} P^{-3}

Mg^{+2} P^{-3}

Mg^{+2}

Mg_3P_2

The block just drawn are all the metals that can have more than 1 charge

Each metal in that block is named with a roman numeral that = s the charge on the metal

(I)

(II)

(III)

(IV)

(V)

(VI)

iron (II) oxide

Fe^{+2} O^{-2} FeO

Fe^{+3} O^{-2} Fe_2O_3

iron(III)oxide

lead(IV) nitride

Pb^{+4} N^{-3}

Pb^{+4} N^{-3}

Pb^{+4} N^{-3}

N^{-3}

Pb_3N_4

Sn_3N_2

tin (II) nitride

Sn^{+2} N^{-3}

Sn^{+2} N^{-3}

Sn^{+2}

Cu_2O

copper (1) oxide

Cu^{+1} O^{-2}

Cu^{+1}

Polyatomic - more than one atom in the charged group.

NH_4^+ ammonium

OH^- hydroxide

CN^- cyanide

NO_3^- nitrate

ClO_3^- chlorate

BrO_3^- bromate

IO_3^- iodate

HCO_3^- bicarbonate

HSO_4^- bisulfate

CO_3^{-2} carbonate

SO_4^{-2} sulfate

PO_4^{-3} phosphate

$C_2H_3O_2^-$ acetate

K^{+1} SO_4^{-2}

$K_2(SO_4)$

Potassium sulfate

Barium Phosphate

Ba^{+2} PO_4^{-3}

Ba^{+2} PO_4^{-3}

Ba^{+2}

$Ba_3(PO_4)_2$

$Ca(OH)_2$

calcium hydroxide

$Fe(OH)_3$

iron(III) hydroxide

Fe^{+3}

OH^-

OH^-

OH^-

p 118 4.11 4.13

p 122 4.21 4.23

$Sn(SO_4)_2$

tin (IV) sulfate

Sn^{+4} SO_4^{-2}

SO_4^{-2}

-4

Homework: p127 4.31
p 128 4.33, 4.35
p134 4.39, 4.41, 4.37

Cu_2S

Copper (1) Sulfide

Cu^{+1} S^{-2}

Cu_{+1}

Al^{+3} I^{-1}

AlI_3

NH_4^+ SO_4^{-2}

NH_4^+

$(NH_4)_2(SO_4)$

$(NH_4)_2SO_4$

Acids - H^+ ion

Bases - OH^- ion

Binary acid - two elements and only two with one being an H^+ and the other being a halogen.

HF hydrofluoric acid

HCl hydrochloric acid

HI hydro iodic acid

HBr hydro bromic acid

Polyatomic ions forming acids

H^+ SO_4^{-2} ← sulfate

H_2SO_4 sulfuric acid

H^+ $C_2H_3O_2^-$ ← acetate

$HC_2H_3O_2$ acetic acid

H^+ PO_4^{-3}

H_3PO_4 phosphoric acid

phosphate

Ba^{+2} OH^-

$Ba(OH)_2$

barium hydroxide

Covalent- 2 nonmetal right side of periodic table. They share e^-s

CO carbon monoxide

CO_2 carbon dioxide

NO nitrogen monoxide

P_2O_5 diphosphorus V oxide

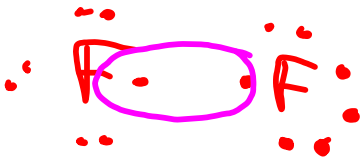
penta

Diatomic atoms

O_2 oxygen

N_2 nitrogen

F_2 fluorine



Cl_2 chlorine

Br_2 bromine

I_2 iodine

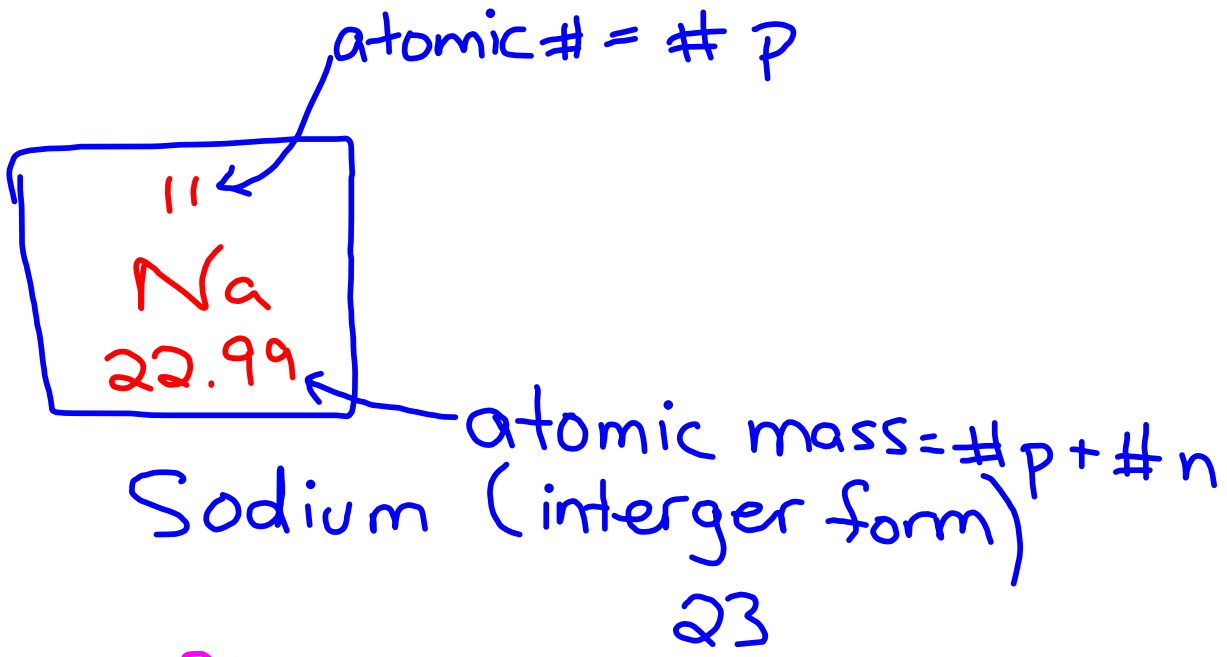
H_2 hydrogen

Quiz Monday

① #5, #6

② naming or give formula

5 cmpds



Sodium (interger form)

23

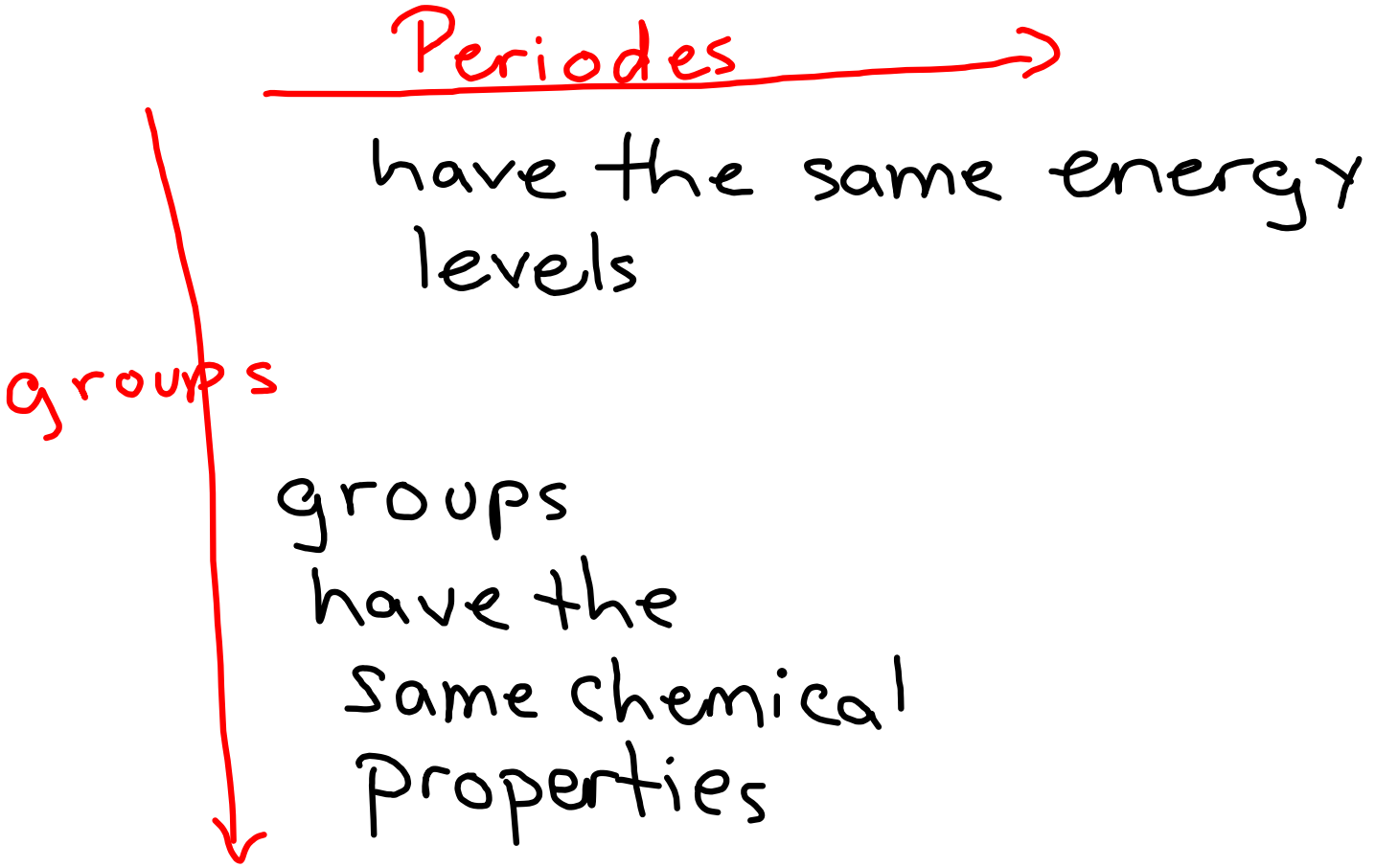
$^{23}_{11}Na$ p 11 n 12 e 11

P = e⁻s when neutral

	charge	mass
p	+1	1
n	0	1
e	-1	0

+1	+2	+3	±4	-3	-2	-1	0
1A	2A	3A	4A	5A	6A	7A	8A
1	2	3	4	5	6	7	8e

2e's He


Periodes
have the same energy levels
groups
groups have the same chemical properties

1A alkali metals

2A alkaline earth metals

3A Boron group

4A Carbon group

5A Nitrogen group

6A Oxygen group

7A Halogens

8A Noble gases

Ar Kr and Xe are reactive

3 - 11 Transition element or metals

58 - 71 Rare earth metals Lanthanide series

90 - 103 Actinide series

4.

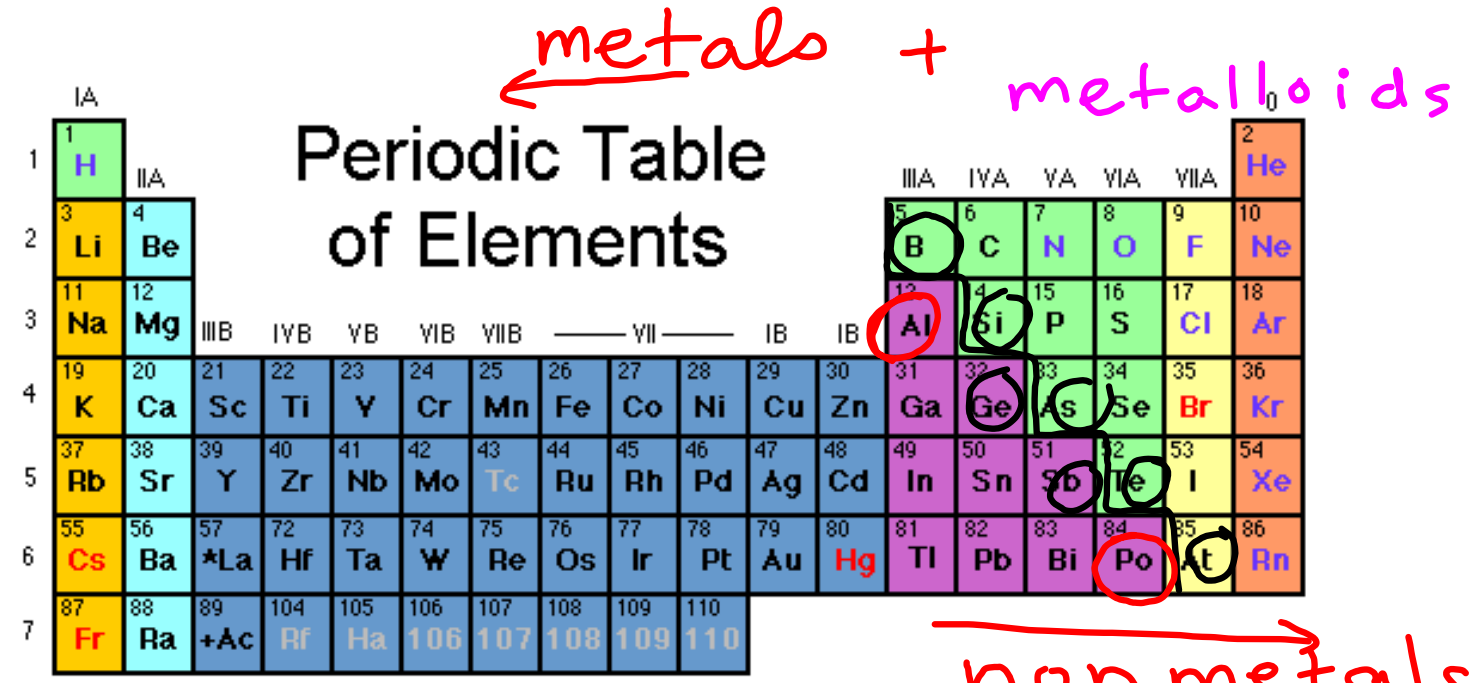
		p	e	n
10	Be	4	4	6
10 − 4 = 6	180 Hf	72	72	108
16	O^{-2}	8	10	8
16	O	8	8	8

p + 8 +8

e − 8 x x = 10

0 −2 ← charges

Valance e⁻s - the outer most e⁻s.



	IA	IIA	IIIB	IVB	VB	VIB	VIIB	VII		IB	IB	IIIA	IVA	VA	VIA	VIIA	0
1	1 H																2 He
2	3 Li	4 Be										5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg										13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba	57 *La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	89 +Ac	104 Rf	105 Ha	106 106	107 107	108 108	109 109	110 110								

* Lanthanide Series	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
+ Actinide Series	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

Legend - click to find out more...

H - gas | Li - solid | Br - liquid | Tc - synthetic

- Non-Metals
- Transition Metals
- Rare Earth Metals
- Halogens
- Alkali Metals
- Alkali Earth Metals
- Other Metals
- Inert Elements

metals

- +charges
- most of them are solid
  - shiny
  - maluble
  - ductile
  - good condutors of heat and electricity

nonmetals

- usually - charges
- (s) (ℓ) (g)
- dull
- brittle
- bad conductor of heat and electricity

metalloids or semimetals have the properties of both.

	P	e	n
$^{205}Tl^{3+}$	81	78	124

Tl^{+3}

	p	e	n
$^{210}Pb^{+4}$	82	78	128

Probability

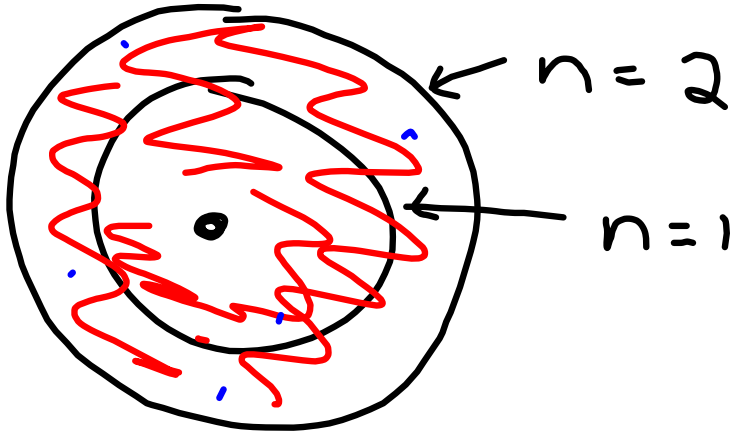
He

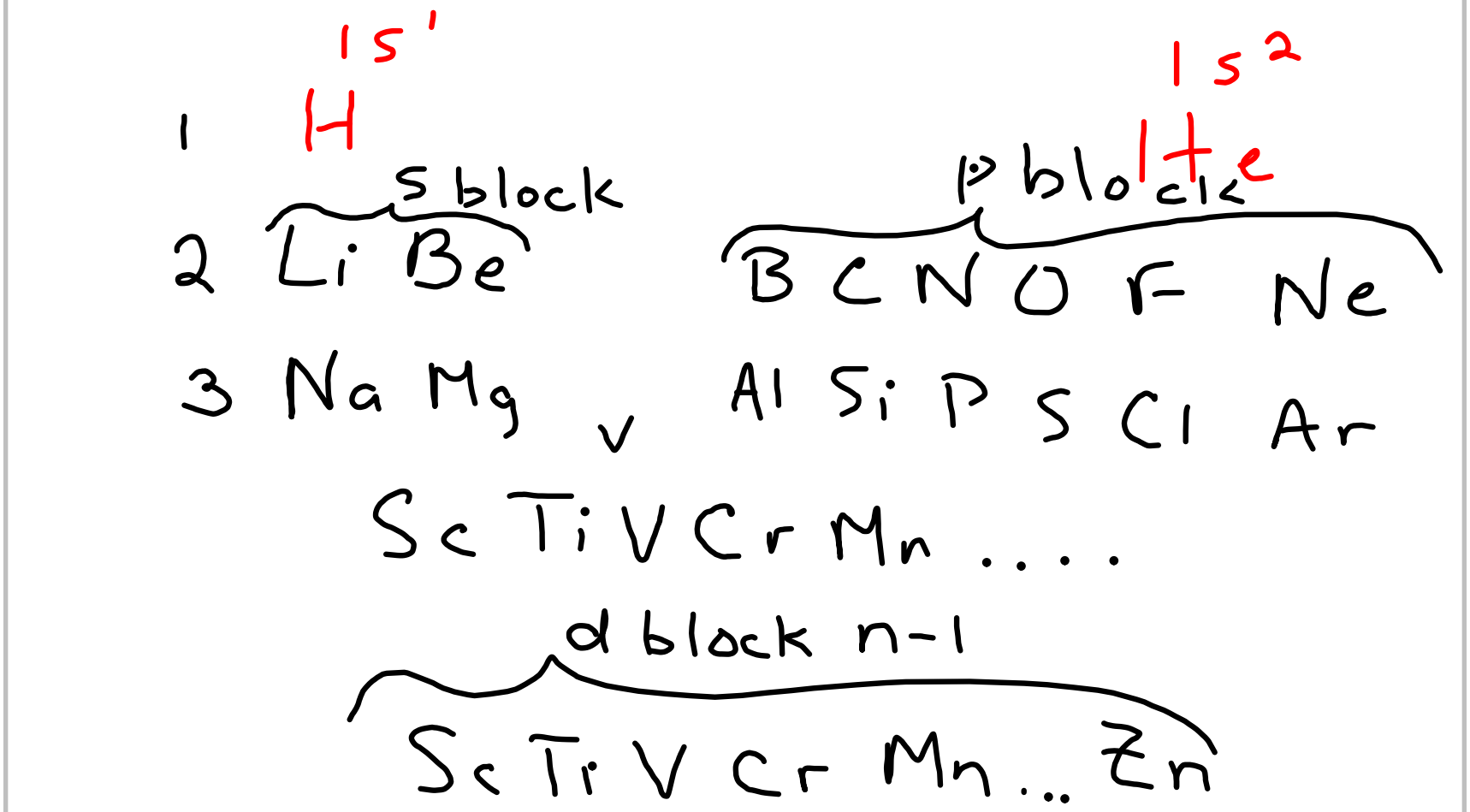
Li

Na

K

Rb




1s¹
1s²
1 H
s block
p block
2 Li Be
B C N O F Ne
3 Na Mg
Al Si P S Cl Ar
Sc Ti V Cr Mn ....
d block n-1
Sc Ti V Cr Mn ... Zn

Li $1s^2\ 2s^1$

N $1s^2\ 2s^2\ 2p^3$

F $1s^2\ 2s^2\ 2p^5$

Be $1s^2\ 2s^2$

Cl $1s^2 2s^2 2p^6 3s^2 3p^5$

$10 + 7 = 17$

27

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

$4s^2 3d^7$

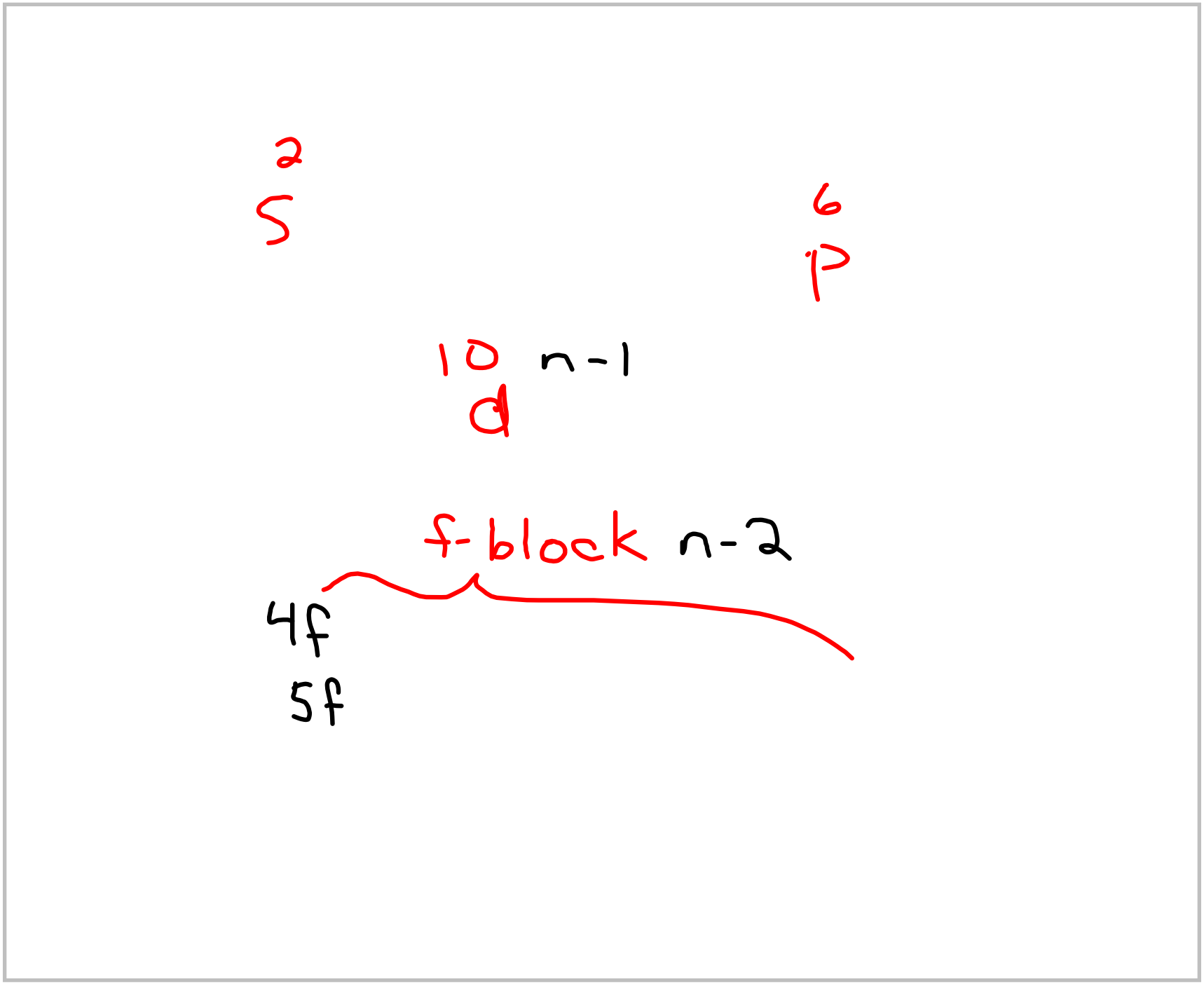
[Ar] $4s^2 3d^7$

18

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

37
Rb

[Kr] $5s^1$


2
s
6
p
10 n-1
d
f-block n-2
4f
5f

U $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^6\ 6s^2\ 5d^{10}\ 4f^{14}\ 6p^6\ 7s^2\ 6d^1\ 5f^3$

$5d^1 \quad 5d^9 = 5d^{10}$

92

$[Rn]\ 7s^2\ 6d^1\ 5f^3$

5

	%	Mass
Cl	75.53	34.96885
Cl	24.47	36.9658

$= (.7553)(34.96885)$
$(.2447)(36.9658)$

26.41197241
$+ \ 9.045533126$
$35.457503 67$
35.46 amu or g

amu = atomic mass unit

All intergers for atoms except for Cl which has a mass of 35.5