Chapter 2 Exercises

1) stability (such as radioactivity), viscosity, "spin" or angular momentum, density, conductivity

2) the heavier isotope of ^{128}Te is more abundant in nature than the abundant isotope of ^{127}I.

3)

	Species	p^+	n^0	e^-
a)	^{7}Li	3	4	3
b)	^{1}H	1	0	1
c)	^{14}C	6	8	6
d)	$^{19}F^{1-}$	9	10	10
e)	$^{54}Fe^{3+}$	26	30	23

4) protons tells you element!

	Species	p^+	n^0	e^-
a)	Ar	18	22	18
b)	K^{1+}	19	20	18
c)	Cl^{1-}	17	18	18

5) (C) $^{16}_{8}O^{2-}$ $n^0 = 8$ $e^- = 10$

6) $^{71}Ga^+$ $m/z = \frac{71}{1}$ = mass of 71 protons = 31 electrons = 30

(B)

7) (B)

8) ^{20}Ne ^{22}Ne mass = 20.180 (or whatever yours says)

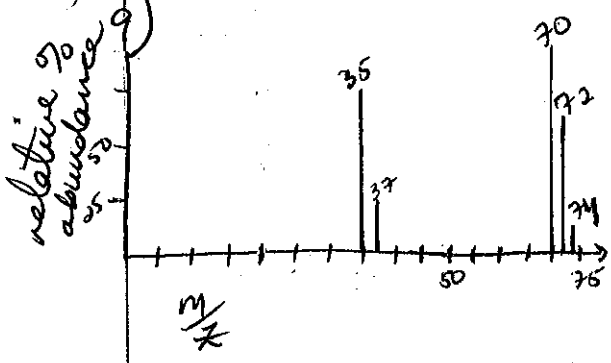
% abundance = x other % abundance (^{22}Ne) = $1 - x$

$20(x) + 22(1-x) = 20.180$

$20x + 22 - 22x = 20.180$ $\quad -22 \quad -22$

$\frac{-2x}{-2} = \frac{-1.82}{-2}$ $\quad x = 0.91 = \boxed{91\%}$

9)



$^{35}Cl \rightarrow 35 \times 2 = 70$ $(^{35}Cl - ^{35}Cl)^{1+} = \frac{70}{1}$

$^{37}Cl \rightarrow 37 \times 2 = 74$ $(^{37}Cl - ^{37}Cl)^{1+} = \frac{74}{1}$

$(^{35}Cl - ^{37}Cl)^{1+} = \frac{72}{1}$

$^{35}Cl^{1+} = \frac{35}{1}$

$^{37}Cl^{1+} = \frac{37}{1}$

m/z

Just an FYI: the 70:72:74 is 9:6:1 on the graph.

10) 78.90% ^{24}Mg x% ^{25}Mg (21.1-x)% ^{26}Mg

$|78.90 - 100| = 21.1\%$ $(0.7890 \times 24) + (x \times 25) + [(0.211 - x) \times 26] = 24.305$

$24.305 = 18.936 + 25x + 5.486 - 26x$

$24.305 = 24.422 + (-x)$

$-24.422 \quad -24.422$

$-0.117 = -x$ $x = 0.117$

$21.1 - 11.7 = 9.4$

11.7% for ^{25}Mg

9.4% for ^{26}Mg

11) (B)

12) (C)

13) (A) transitions 5→2, 4→2, 3→2

14) (C)

15) 4s, 4p, 4d, 4f

16) s = 1 orbital, p = 3 orbitals, d = 5 orbitals, f = 7 orbitals

4s ↿⇂ 3p ↿⇂ ↿⇂ ↿⇂
3s ↿⇂ 2p ↿⇂ ↿⇂ ↿⇂
2s ↿⇂
1s ↿⇂

17) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

18) Phosphorus = 15 e⁻

3p: 1 1 1
3s ↿⇂ 2p ↿⇂ ↿⇂ ↿⇂
2s ↿⇂
1s ↿⇂

3 unpaired e⁻

19) (C)

20) (C)

21) a) V: $1s^2 2s^2 2p^6 3s^2 3d^3 4s^2$ b) K: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$
c) Se: $1s^2 2s^2 2p^6 3s^2$
d) Sr: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 5s^2$

22) I: [Kr] $5s^2 4d^{10} 5p^5$ (includes $3d^{10}$) (D)

23) (C)

24) Ti: [Ar] $3d^2 4s^2$ $3d^2$ = 1 1 _ _ _ (B)

25) a) O^{2-}: $1s^2 2s^2 2p^6$ b) Cl^-: $1s^2 2s^2 2p^6 3s^2 3p^6$
c) Ti^{3+}: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^1$
d) Cu^{2+}: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$

26)

Ion	3d					4s
a) Ti^{2+}	1	1				
b) Fe^{2+}	↿	1	1	1	1	
c) Ni^{2+}	↿⇂	↿⇂	↿	1	1	
d) Zn^{2+}	↿⇂	↿⇂	↿⇂	↿⇂	↿⇂	

27) a) Ne: $1s^2 2s^2 2p^6$
b) F^{1-} and Na^{1+} (also O^{2-}, N^{3-}, Mg^{2+}, Al^{3+})

28) a) Cl: $1s^2 2s^2 2p^6 3s^2 3p^5$
b) Nb: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 5s^2 4d^3$
c) Ge: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^2$
d) Sb: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 5s^2 4d^{10} 5p^3$

29) a) Si b) Mn c) Sr d) Sc

30) Sn: $[Kr] 5s^2 4d^{10} 5p^2$ 2 orbitals: 1 1 _

31) Ba: $[Xe] 6s^2$ → has $3d^{10}$ + $4d^{10}$ = 20 e^-

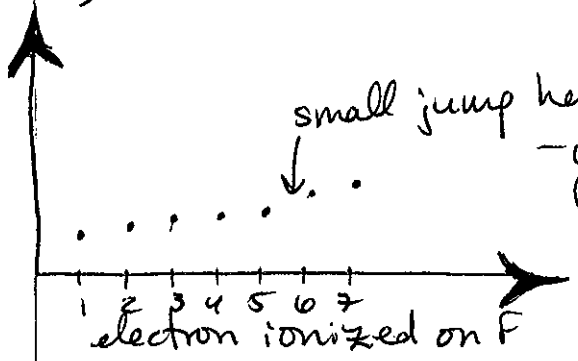
32) Cd^{2+}: $[Kr] 4d^{10}$

33) (B)

34) (B)

35) a) there is a change in energy levels between the 4th and 5th values
b) there's a sub-level change between the 2nd and 3rd values.

36)



37) a) effective nuclear charge increases across period
b) Full sub-levels are more stable than partially filled
c) Half-filled sub-levels are more stable than partial.