SCH3U Periodic Trends and Quantum Quiz 2016 /43
Answer Section

MULTIPLE CHOICE

1. ANS: D   PTS: 1   REF: K/U   OBJ: 1.1
    STA: MC1.02
2. ANS: C   PTS: 1
3. ANS: B   PTS: 1   REF: K/U   OBJ: 1.5
    STA: MC1.02
4. ANS: C   PTS: 1   REF: K/U   OBJ: 1.5
    STA: MC1.02
5. ANS: C   PTS: 1   REF: K/U   OBJ: 1.5
    STA: MC1.02
6. ANS: A   PTS: 1   REF: I   OBJ: 1.5
    STA: MC2.02
7. ANS: D   PTS: 1   REF: I   OBJ: 1.5
    STA: MC1.06
8. ANS: C   PTS: 1   REF: I   OBJ: 1.5
    STA: MC1.02
9. ANS: B   PTS: 1   REF: I   OBJ: 1.5
    STA: MC2.02
10. ANS: B   PTS: 1   REF: I   OBJ: 1.5
    STA: MC2.02

SHORT ANSWER

11. ANS:
    - the ball on the steps is restricted to specific levels; it cannot sit between steps
    - the ball can only possess fixed amounts (quanta) of energy, specific to each step
    - In the B-R model, atoms possess specific quanta of energy at each energy level and cannot have a quantity
    of energy between the level

    PTS: 1   REF: I   OBJ: 1.6   STA: MQ1.03
12. ANS:
    - analyzing the line spectrum of the sample will allow the scientist to compare it to the line spectra of known
    elements
    - from that information, the scientist can infer the identity of the element(s) in the gas

    PTS: 1   REF: MC   OBJ: 1.4   STA: MQ2.01
13. ANS:
    A periodic trend is one that repeats at regular intervals.

PTS: 1   REF: C   OBJ: 1.5   STA: MC2.02

14. ANS:
Li = 3-2 = +1
N = 7-2 = +5

These elements both have the same number of energy levels, but the higher core charge of nitrogen results in the outer electrons being drawn closer to the nucleus. Nitrogen, therefore has a smaller radius than lithium.

PTS: 1

15. ANS:
More electron repulsion within the same energy level but same core charge so the outer level is pushed further away

PTS: 1

16. ANS:
Ba has more energy levels (larger) than Mg, and the same core charge, therefore it is easier to remove an outer electron.

PTS: 1

17. ANS:
a. element Z – highest I.E and not clear jump indicating moving to inner level
b. element Y   2nd/1st = 1.9663   3rd/2nd = 5.3304   Highest ratio between second and third indicating third electron is being removed from an inner orbit.

PTS: 1   REF: I   OBJ: 1.5   STA: MC2.02

18. ANS:
Most metals, especially those in the alkali and alkaline groups, want to form cations by giving away e- rather than forming anions by assuming an e- from another atom. For this reason, it is difficult to measure the EA of metals.

PTS: 1

19. ANS:
Both likely high as if it is more difficult to remove an electron it is more likely to gain

PTS: 1

20. ANS:
Since Hydrogen has 1 valence electron it is usually placed in the alkali metal group. However, similar to the halogens, hydrogen also only needs one electron to have a full valence and shares other properties with the halogens (gas state, reacts with metals) .

PTS: 1

21. ANS:
Fr, wants to lose electron, biggest atom (most energy levels) so easiest to give one up. Fr has the lowest ionization energy.

PTS: 1

22. ANS:
Atomic radii increases down a group, resulting in a decrease in ionization energy. This results in increasing reactivity moving down a group for metals as their reactions for form stable ions involves losing their valence electrons. Atomic radii also increases down a group form non-metals which decreases their electron affinity as electrons added to the outer energy level are less attracted to the nucleus. This decreases the reactivity of non-metals moving down a group as their reactions for form stable ions involves gaining valence electrons

PTS: 1

23. ANS:
ionization enegy only, smaller than potassium so harder to remove outer electrons

PTS: 1

24. ANS:
Line spectra for elements other than hydrogen and IE trend exceptions [provide at least one specific example --> Be higher than B and N higher than O]

PTS: 1

25. ANS:
- atoms are roughly spherical in shape
- atoms are the smallest unit of elements
- atom of different elements have different masses

PTS: 1
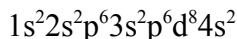
26. ANS:
No subatomic particles in Dalton's model

PTS: 1

27. ANS:
x= 100 - 92.2-3.1= 4.7%
Therefore, the percent abundance of silicon-29 is 4.7%

PTS: 1

28. ANS:
$1s^2 2s^2 p^6 3s^2 p^6 d^8 4s^2$
PTS: 1

29. ANS:
a. iv - noble gases don't ionize
b. biggest and most unstable before loss of second electron, therefore ii. losing second d2 and becoming just 4s2.
c. iii.
d. v. – has partial stability with 1 electron in each p orbital. Therefore takes more energy to remove an electron than expected

PTS: 1