

Answer Section

SHORT ANSWER

1. ANS:

Element name	Element symbol	Atomic number	Group number	Family name	Period number	Metal or nonmetal
fluorine	F	9	17	halogens	2	nonmetal
barium	Ba	56	2	alkali earth metals	6	metal
argon	Ar	18	18	noble gas	3	nonmetal

2. ANS:

2

3. ANS:

halogens

4. ANS:

Noble gases have extremely low boiling points. Thus, they are gases at SATP. They are also chemically unreactive.

5. ANS:

Electronegativity is a measure of an element's ability to attract electrons.

6. ANS:

Elements arranged in order of increasing atomic mass show a periodic recurrence of properties at regular intervals.

7. ANS:

Ionization energy is the energy required to remove an electron from an atom. Electron affinity is the energy released when an atom accepts an electron.

8. ANS:

Ionization energy increases because atomic radius decreases. This happens because the nuclear charge increases, but the number of energy levels does not. Therefore, the nucleus has a stronger hold on the electrons as the nuclear charge increases.

9. ANS:

A periodic trend is one that repeats at regular intervals.

10. ANS:

Element B would be highest and element A would be lowest. Element C would lie in between.

11. ANS:

The number of electrons affects the atomic radius in two ways. First, the number of populated energy levels; the more energy levels, the larger the atomic radius. Second, the number of electrons; the more electrons between the nucleus and the valence electrons, the more shielding occurs and the larger the atomic radius.

12. ANS:

The atom has to absorb energy in order to accept an electron.

13. ANS:

When an electron is added to an atom it is repelled by the electrons already there, but is attracted by the nucleus. When the repulsion outweighs the attraction, energy is absorbed.

14. ANS:

The smaller the atomic radius, the stronger the nucleus holds its electrons and the harder it is to remove an electron. The harder it is to remove an electron, the higher the first ionization energy.

15. ANS:

helium

16. ANS:

element Z, element Y, element X

17. ANS:

same chemical family

18. ANS: higher

19. ANS:

They are both dependent on the same thing, atomic radius. When the atomic radius is small, it is more difficult to remove an electron, so ionization energy is high. At the same time, it is easier for the atom to accept another electron, so it releases energy when an electron is added and electron affinity is high.

MULTIPLE CHOICE

- |           |        |          |             |
|-----------|--------|----------|-------------|
| 1. ANS: B | REF: I | OBJ: 4.2 | LOC: QC2.03 |
| 2. ANS: A | REF: I | OBJ: 4.2 | LOC: QC2.03 |
| 3. ANS: B | REF: I | OBJ: 4.5 | LOC: QC2.02 |
| 4. ANS: A | REF: I | OBJ: 4.5 | LOC: QC2.02 |

ATOMIC STRUCTURE: COMPLETION

- |                  |          |          |
|------------------|----------|----------|
| 1. ANS: orbital  | REF: C   | OBJ: 3.5 |
| LOC: SP2.01      |          |          |
| 2. ANS: hydrogen | REF: K/U | OBJ: 3.4 |
| LOC: SP1.01      |          |          |

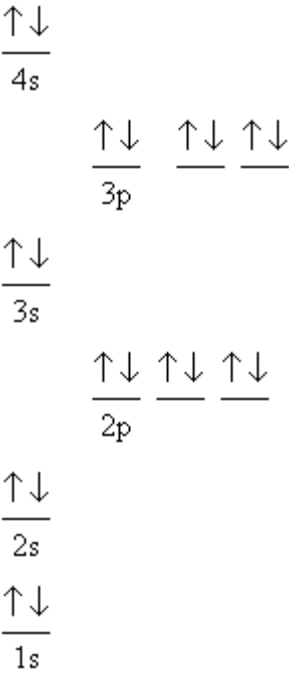
3.	ANS: Heisenberg LOC: SP1.02	REF: K/U	OBJ: 3.7
4.	ANS: S LOC: SP1.03	REF: K/U	OBJ: 3.6
5.	ANS: three LOC: SP1.03	REF: K/U	OBJ: 3.6
6.	ANS: ground state LOC: SP1.01	REF: K/U	OBJ: 3.4
7.	ANS: principal quantum number LOC: SP1.01	REF: K/U	OBJ: 3.4
8.	ANS: iso-electronic LOC: SP1.03	REF: K/U	OBJ: 3.6
9.	ANS: metals LOC: SP1.03	REF: K/U	OBJ: 3.6
10.	ANS: argon LOC: SP2.02	REF: C	OBJ: 3.6

**MATCHING**

11.	ANS: E	REF: K/U	OBJ: 3.7	LOC: SP1.02
12.	ANS: A	REF: K/U	OBJ: 3.5	LOC: SP1.02
13.	ANS: B	REF: K/U	OBJ: 3.7	LOC: SP1.02
14.	ANS: G	REF: K/U	OBJ: 3.1	LOC: SP1.01
15.	ANS: I	REF: K/U	OBJ: 3.5	LOC: SP1.02

**SHORT ANSWER**

16. ANS:  
The ionization energies tend to increase because the nuclear charge increases as you move from left to right on a period, but the number of energy levels remains the same.

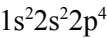


17. ANS: 1s
18. ANS:
- ↑↓   ↑   ↑

2p
- ↑↓

2s
- ↑↓

1s



Pauli exclusion principle states that no two electrons can have the same four quantum numbers, therefore each orbital can hold only two electrons with opposite spins. Hund's rule says that the electrons in orbitals with the same energy are half filled first before more are added. Also, the electrons in those half filled orbitals must have the same spin.

19. ANS:  
Electrons can only absorb specific amounts of energy. When they lose that energy, it corresponds to specific colours of light as opposed to a spectrum.
20. ANS:

Electrons may only possess specific amounts of energy thus they can only exist at specific distances from the nucleus.

21. ANS:

An orbit is a path on which an electron travels around the nucleus. It is thus two dimensional. An orbital is a region of space in which there is a high probability of finding an electron. It is three dimensional.

22. ANS:

The most reactive element is francium because it is the largest and need only lose one electron in order to be iso-electronic with a noble gas.

23. ANS:

The work of Planck had given everyone the idea that energy could have a smallest particle. Also, the line spectra of elements indicated that the energy differences for electrons were limited. He surmised that the absolute energies must also be limited.

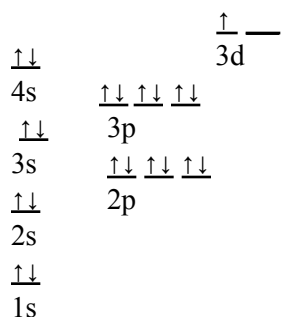
24. ANS:

Both orbits and orbitals have energies that determine their size. However, orbits are two-dimensional paths, while orbitals are three dimensional areas. Orbits are predictions of definite paths of electrons, while orbitals are areas where electrons are most likely to be found.

25. ANS:

A quantum of energy is a bundle of energy. Many quanta make up light.

26. ANS:



27. ANS:

- s - reactive, metals, solids, mono-valent
- p - varied, some gases and liquids as well as solids
- d - metals but not as reactive as s block, multivalent