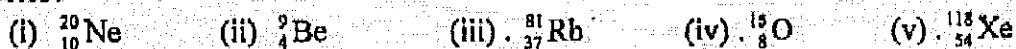


The Open University of Sri Lanka
Foundation Course in Science
CMF 2205 – 2012 /2013
Home Assignment I

Answer all Questions.

- 01 (a) What are the three states of matter? List three characteristic properties of each state.
 (b) Give three important assumptions of Dalton's atomic theory.
 (c) When 7 g of Nitrogen is reacted with 16 g of Oxygen 23 g of Nitrogen dioxide is formed. According to the law of conservation of mass how much Nitrogen is required to form 184 g of Nitrogen dioxide?
 (d) How many protons, neutrons and electrons are present in each of the following species?



(e) Define the following terms

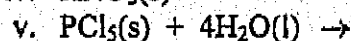
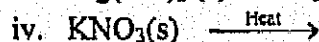
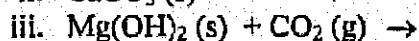
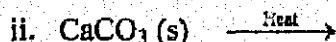
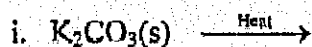
- (i) Isotopes (ii) Atomic Number
 (iii) First ionization energy (iv) Radioactivity

(f) Write down the electronic configuration for the following elements

- (i) K (ii) Zn (iii) Cr (iv) Cu (v) Kr

- 02 (a) How does the atomic radius changes cross the second period (Li to F) of the periodic table and give three reasons for the variations
 (b) Give reasons the first ionization of N is bigger than O
 (b) Arrange the following species in increasing order of first ionization energy.
 Give reasons C B Al N
 (c) " The first and second electron affinities for S are -200 kJ/mol and +332 kJ/mol respectively." Explain.

(d) What are the products for the following reactions.give the balance equation



(e) Calculate the oxidation number of d-block elements present in following compounds.

- i. Fe_3O_4
 ii. $[\text{Fe}(\text{SCN})(\text{H}_2\text{O})_5]^{2+}$
 iii. $\text{K}_2\text{Cr}_2\text{O}_7$
 iv. KMnO_4
 v. TiO

ශ්‍රී ලංකා විද්‍යා විශ්ව විද්‍යාලය
විද්‍යා පදනම් පාඨමාලාව
CMF - 2205 - 2012/2013

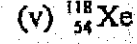
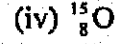
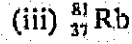
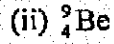
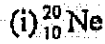
සියළුම ප්‍රශ්න වලට පිළිතුරු සපයන්න.

01. (a) පදාර්ථයේ මූලික අවස්ථා තුන මොනවා ද? එක් එක් අවස්ථාවට ආවේණික ලක්ෂණ තුන බැගින් ලියන්න.
- (b) බොල්ටන්ගේ පරමාණුක වාදයේ වැදගත් උපකල්පන තුනක් ලියන්න.
- (c) නයිට්‍රජන් 7 g ක්, ඔක්සිජන් 16 g ක් සමඟ ක්‍රියා කළ විට නයිට්‍රජන් ඩයොක්සයිඩ් 23 g ක් සෑදේ. සකන්ධ සංස්ථිති නියමයට අනුව නයිට්‍රජන් ඩයොක්සයිඩ් 184 g ක් නිපදවීමට අවශ්‍ය නයිට්‍රජන් ප්‍රමාණය ගණනය කරන්න.
- (d) පහත පරමාණුවල අඩංගු ප්‍රෝටෝන, නියුට්‍රෝන හා ඉලෙක්ට්‍රෝන ගණන ලියන්න.
(i) ${}_{19}^{20}\text{Ne}$ (ii) ${}_{4}^9\text{Be}$ (iii) ${}_{37}^{81}\text{Rb}$ (iv) ${}_{8}^{15}\text{O}$ (v) ${}_{54}^{118}\text{Xe}$
- (e) පහත සඳහන් පද අර්ථ දක්වන්න.
(i) සමස්ථානික (ii) පරමාණුක අංකය
(iii) පළමු අයනීකරණ ශක්තිය (iv) විකිරණශීලීතාවය
- (f) පහත සඳහන් මූලද්‍රව්‍ය වල ඉලෙක්ට්‍රෝන වින්‍යාසය ලියන්න.
(i) K (ii) Zn (iii) Cr (iv) Cu (v) Kr
02. (a) පරමාණුක අරය දෙවන ආවර්තය දිගේ (Li සිට F) ඓනස්ථිත ආකාරය දක්වන්න. ඉන් අපගමනය වන අවස්ථා සඳහා හේතු 3 ක් දෙන්න.
- (b) N හි පළමු අයනීකරණ ශක්තිය, O ට වඩා වැඩි වීමට හේතු දෙන්න.
- (c) "S වල පළමු හා දෙවන ඉලෙක්ට්‍රෝන බන්ධනාභයන් පිළිවෙළින් -200 kJ/mol සහ +332 kJ/mol වේ". පහදන්න.
- (d) පහත මූලද්‍රව්‍ය වල පළමු අයනීකරණ ශක්තිය වැඩි වන පිළිවෙළට හේතු දෙමින් සකසන්න.
- (e) පහත සඳහන් රසායනික ප්‍රතික්‍රියා සඳහා ලැබෙන එල ලියා දක්වන්න. එම සමීකරණ කුලීන කරන්න.
(i) $\text{K}_2\text{CO}_3(\text{s}) \xrightarrow{\Delta}$
(ii) $\text{CaCO}_3(\text{s}) \xrightarrow{\Delta}$
(iii) $\text{Mg}(\text{OH})_2(\text{s}) + \text{CO}_2(\text{g}) \longrightarrow$
(iv) $\text{KNO}_3(\text{s}) \xrightarrow{\Delta}$
(v) $\text{PCl}_5(\text{s}) + 4\text{H}_2\text{O}(\text{l}) \longrightarrow$
- (f) පහත සඳහන් සංයෝග වල අන්තර්ගත d-ඉන්ඩ්‍රොවේ මූලද්‍රව්‍ය සඳහා ඔක්සිකරණ අංක ගණනය කරන්න.
(i) Fe_3O_4
(ii) $[\text{Fe}(\text{SCN})(\text{H}_2\text{O})_5]^{2+}$
(iii) $\text{K}_2\text{Cr}_2\text{O}_7$
(iv) KMnO_4
(v) TiO

The Open University of Sri Lanka
Foundation Course in Science
CMF2205 – 2012/2013
Home Assignment 1

அனைத்து வினாக்களுக்கும் விடையளிக்குக.

- 1(a) சடப்பொருள் ஒன்றின் 3 நிலைகளும் யாவை? ஒவ்வொரு நிலைகளினதும் தனித்துவமான இயல்புகளை பட்டியல்படுத்துக.
- (b) டால்டனின் அணுக்கொள்கையில் காணப்படும் மிகமுக்கியமான 3 எடுகோள்கள் எவை?
- (c) 7g திணிவுடைய நைதரசனானது 16g திணிவுடைய ஓட்சிசனுடன் தாக்கமுற்று 23g திணிவுடைய நைதரசனீரொட்சைட்டு பெறப்பட்டது. திணிவுக்காப்பு விதிக்கமைய 184g திணிவுடைய நைதரசனீரொட்சைட்டு உருவாகுவதற்கு தேவையான நைதரசனினது திணிவு யாது?
- (d) பின்வருவனவற்றில் காணப்படும் புரோத்திரன், நியூத்திரன் மற்றும் இலத்திரன்களினது எண்ணிக்கையை தருக?



(e) பின்வரும் பதங்களை விளக்குக.

(i) சமதானி

(ii) அணுவெண்

(iii) முதலாம் அயனாக்கற்சக்தி

(iv) கதிர்த்தொழிற்பாடு

(f) பின்வரும் மூலகங்களினது இலத்திரனிலையமைப்பை எழுதுக.

(i) K

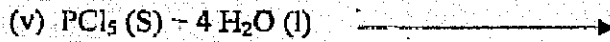
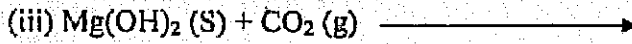
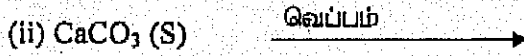
(ii) Zn

(iii) Cr

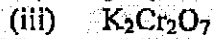
(iv) Cu

(v) Kr

- 2 (a) ஆவர்த்தன அட்டவணையில் இரண்டாவது வரிசை மூலகங்களின்(Li - F)அணுவாரையானது அலை ஆவர்த்தனத்தின் குறுக்கே செல்கையில் எவ்வாறு வேறுபடுகின்றது? அவ்வேறுபாட்டிற்கான 3 காரணங்கள் தருக.
- (b) N இனது முதலாம் அயனாக்கற்சக்தியானது O இனது முதலாம் அயனாக்கற்சக்தியிலும் பெரியதாகும். இதனை விளக்குக.
- (c) பின்வருவனவற்றை அவற்றின் முதலாம் அயனாக்கற்சக்தி அதிகரிக்கும் வரிசையில் ஒழுங்கு படுத்துக, காரணம் தந்து விளக்குக
- C B Al N
- (d) S இனது முதலாம் மற்றும் இரண்டாம் இலத்திரனாட்டப்பெறுமானங்கள் முறையே -200kJ/mol மற்றும் +332kJ/mol. இதனை விளக்குக.
- (e) பின்வரும் தாக்கங்களின் விளைவுகள் யாவை? சமப்படுத்திய சமன்பாடுகளை தருக.



- (f) பின்வரும் சேர்வைகளில் காணப்படும் d- தொகுதி மூலகங்களின் ஓட்சியேற்ற எண்ணை கணிக்குக.



CMF 2205

Home Assignment -- 1 (Answer Guide)

1.

- a) Gas -
1. Gas has no fixed volume or shape. It takes up the volume and shape of its container.
 2. The particles in a gas are far apart (compressible)
 3. They are moving at high speeds colliding repeatedly with each other and with the walls of the container.
- Liquid -
1. A liquid has a definite volume independent of its container, but has no definite shape. It takes up the shape of the portion of the container that it occupies.
 2. The particles in a liquid are packed more closely together than in a gas.
 3. They move rapidly sliding over each other.
- Solid -
1. A solid has a distinct volume and shape.
 2. In a solid, the particles are packed tightly together to give a definite arrangement.
 3. They do not move easily. The rigid particles cannot move or slide one another.
- b) 1. All matter is composed of tiny particles called atoms that are indivisible and indestructible.
2. All atoms of a particular element are identical but differ from those of any other element.
3. Atoms of different elements combine in simple ratios to form compounds.

c) Mass of N_2 required to form 184 g of NO_2 = $(7 \times 184) / 23$ g = 56 g

d)

Specie	No. of electrons	No. of protons	No. of neutrons
$^{20}_{10}Ne$	10	10	10
9_4Be	4	4	5
$^{85}_{37}Rb$	37	37	44
$^{16}_8O$	8	8	7
$^{118}_{54}Xe$	54	54	64

- e) (i) Atoms with similar atomic number but with different mass numbers are called isotopes.

- (ii) The number of protons in the nucleus of a given atom is called the atomic number.
- (iii) The first ionization energy is the amount of energy needed to remove the most loosely bound electron of a neutral gaseous atom.
- (iv) The spontaneous breakdown of an unstable nucleus with the emission of energy in the form of radiation is called as radioactivity

- f) (i) K - $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$ or $[\text{Ar}]4s^1$
 (ii) Zn - $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$ or $[\text{Ar}]4s^2 3d^{10}$
 (iii) Cr - $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$ or $[\text{Ar}]4s^1 3d^5$
 (iv) Cu - $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10}$ or $[\text{Ar}] 4s^1 3d^{10}$
 (v) Kr - $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$ or $[\text{Ar}] 4s^2 3d^{10} 4p^6$

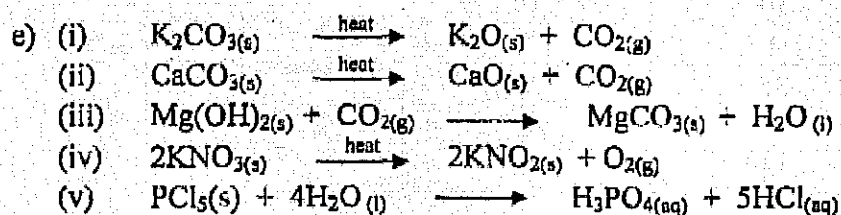
2.

- a) The atomic radius decreases across the second period. Reasons for the variation:
1. The decrease in atomic size as the atomic number increases from Li to F.
 2. Atomic size of the element decreases when the effective nuclear charge of the atom increases.
 3. Also the outer electrons of an atom are drawn closer to the nucleus resulting in a smaller atomic radius.

- b) Electron configuration of N is $1s^2 2s^2 2p^3$ and the electron configuration of O is $1s^2 2s^2 2p^4$. N has half filled 2p level which is particularly stable. But O has 2p level more than half filled which is less stable compared to the half filled 2p level. Therefore N has higher first ionization energy than O.

c) Not marked

- d) The 1st electron affinity of S is negative and refers to the addition of one electron to a neutral gaseous atom to form a singly charged negative ion. However, the 2nd electron affinity of S possesses a positive value. This is because the 2nd electron must be forced against the net negative charge of the ion.



- f) (i) +3 and +2 (ii) +3 (iii) +6 (iv) +7 (v) +2