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Name: _____ R. No.___ Class/ Sec:_____ Date:_____ Invig. Sign_____

# ATOMIC ENERGY CENTRAL SCHOOL, NARORA

## CLASS XI CHEMISTRY HALF YEARLY EXAMINATION 2018-19

**MM: 70** **TIME: 3 Hr.**

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**General Instructions:**

a) All the 27 questions are compulsory.

b) Questions **1** to **5** are very short answer type questions and carry **one** mark each.

c) Questions **6** to **12** are short answer type questions and carry **two** marks each.

d) Questions **13** to **24** are short answer type questions and carry **three** marks each.

e) Questions **25** to **27** are long answer type questions and carry **five** marks each.

f) There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three questions in five marks each. You have to attempt only one of the choices in such questions.

g) Use of calculators is **not** permitted. However, you may use log tables if necessary.

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Q1- Define Boyle's point and compressibility factor.

Q2- What is periodic function?

Q3- Derive the ideal gas equation PV= nRT.

Q4- Write one difference between vapour and gas.

Q5- State 3rd law of thermodynamics.

Q6- Calculate Root mean square velocity of oxygen gas at 27°c.

Q7- Three non reacting gases A,B and C are taken in a 5L closed container in the ratio of 1:2:3 at 1.5 atmospheric pressure and 27°c temperature. Find the partial pressure of each component gases.

Q8- State and explain mathematically the Dalton's Law of partial pressure.

Q9- Calculate the temperature at which the RMS velocity of $O_2$ gas is equal to 1500 $ms^{-1}$.

Q10- Write Vanderwaals equation for 1 mole of the gas. What is the difference between ideal gas and real gas(only two points)?

Q11- 3-Molar solution of $H_2SO_4$ has density 1.02 g/cm$^3$. Find the mole fraction of each component.

Q12- What mass of butane is required in grams to produce 224 L of $Co_2$ gas at NTP on its complete combustion?

OR

49% $H_3PO_3$ has density of 1.05 g/cm$^3$. Calculate the molarity of hydrogen and phosphate ion separately.

Q13- Calculate the number of molecules present in 350 cm$^3$ of $NH_3$ gas at 273K and 2 atmospheric pressure.

Q14- Predict the hybridization in the central atom and draw the shape of the following molecules-

(a)$SF_4$ (b) $ClF_3$ (c) $XeF_4$

Q15- What is formal charge? Calculate the formal charge on both nitrogen atom present in $N_2O$.

Q16- Define overlapping and hybridization. Draw the orbital overlapping diagram of $C_2H_4$ and $C_2H_2$.

Q17- Write any two limitations of V.B.T. Draw the molecular orbital energy diagram for $C_2$ and $B_2$ molecules using LCAO concept.

Q18- Write Balmar equation for the 3$^{rd}$ balmar series of spectral lines. Calculate the number of spectral lines when an electron jumps from 6$^{th}$ energy level to 2$^{nd}$ energy level.

Q19- Find the difference of energy between the 1$^{st}$ and 3$^{rd}$ Lyman series of spectral lines for $Li^{+2}$ in ev/atom.

Q20- Write the sub shell wise electronic configuration of $Zn^{2+}$ , $Cu^{+}$ and $Mn^{2+}$ and also calculate unpaired electrons present in them.

Q21- Write general electronic configuration of d and f block elements and write their two important characteristics separately.

Q22- State 2$^{nd}$ law of thermodynamics. Derive the expression-

$\Delta G^\circ = -W_{\text{non expansion work}}$

Q23- Equilibrium constant for a reversible reaction is $10^{-11}$, find $\Delta G^0$ and predict the nature of reaction.

Q24- Define entropy and enthalpy. Derive the expression $\Delta G = -T\Delta S$.

Q25- Arrange the following as per the given instructions-

a- N , O , F , Cl (increasing negative $\Delta_{eg}H$)

b- Rb , Cs , Li , Na (increasing ability to form peroxide)

c- Be , B , O , N (Increasing $\Delta_iH$)

d- Kcl , $BCl_3$ , $BeCl_2$ (increasing covalent character )

e- $N_2O_5$ , $P_2O_5$ , $Cl_2O_7$ (increasing acidic character)

OR

Expalin with suitable reasons-

a- 2nd $\Delta_iH$ of oxygen is greater than the 2nd $\Delta_iH$ of nitrogen.

b- Negative $\Delta_{eg}H$ of nitrogen is less than oxygen .

c- Tl , Bi and Pb compounds are more stable in their lower oxidation state.

d- Boiling point of inert gases increases on moving down the group.

e- $[AlF_6]^{3-}$ exist but $[BF_6]^{3-}$ does not?

Q26- State the law of chemical equilibrium and Le-chatlier principle. Derive the expression - $K_P = K_C . RT^{\Delta n}$

OR

Define physical and chemical equilibrium. Write any two characteristics of chemical equilibrium and two characteristics of equilibrium constant.

Q27- Define resonance and dipole movement. Draw the resonating structures of $O_3$ , $CO_2$ and $ClO_4^-$

OR

Draw the electron dot structures of the following compounds-

a- $H_2SO_4$ b- $SO_3$ c- $N_2O_5$ d- $H_3PO_4$ e- $H_2CO_3$

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