

Olimpiada topshiriqlari

Kimyo 11

1-qism: Har bir topshiriq 0,9 balldan baholanadi

1. A – noma'lum oltingugurt oksidi. Uning 1 g ida $9.406 \cdot 10^{21}$ ta molekula bo'lsa, noma'lum oksidni aniqlang.

- A) SO B) SO₂
C) SO₃ D) SO₄

2. 1 molekula ozonning (O₃) massasini aniqlang.

- A) 48 g B) 16 g
C) $7.97 \cdot 10^{-23}$ g D) $2.66 \cdot 10^{-23}$ g

3. Qaysi qatorda Zn²⁺ ionining elektron konfiguratsiyasi to'g'ri ko'rsatilgan?

- A) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9 4s^1$ B) $1s^2 2p^6 3s^2 3p^6 3d^{10} 4s^0$
C) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9 4s^2$ D) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^0$

4. Oltingugurtning allotropik ko'rinishlaridan birida (S_x) 8 g oltingugurt na'munasi $2.508 \cdot 10^{22}$ ta molekula saqlasa, oltingugurt molekulasi formulasini aniqlang.

- A) S₄ B) S₆
C) S₈ D) S₁₀

5. 10 l gaz 2 l gacha izotermik (T=const) qisilganda bosim 25 kPa bo'ldi. Dastlabki bosimni aniqlang.

- A) 3 kPa B) 5 kPa
C) 7 kPa D) 9 kPa

6. 1.4 g A metal atmosfera azoti bilan reaksiyaga kirishib ($6A + N_2 = 2A_3N$) 2.33 g A₃N hosil qilgan bo'lsa, A ni aniqlang.

- A) Li B) Na
C) K D) Rb

7. 3p, 3d, 4s va 4p energetik pog'onachalarni elektronlar bilan to'lish ketma-ketligida joylashtiring.

- A) 3p, 3d, 4s, 4p B) 3p, 4s, 3d, 4p
C) 4p, 4s, 3p, 3d D) 3d, 3p, 4s, 4p

8. Tabiiy litiy ikki barqaror izotop ⁶Li (7.3%) va ⁷Li (92.7%) lardan iborat bo'lsa, litiyning atom massasini aniqlang.

- A) 6.727 B) 6.827
C) 6.927 D) 6.967

9. $N_2 + O_2 = 2NO$ reaksiya uchun to'g'ri reaksiyaga massalar ta'siri qonunini ko'rsating.

- A) $v_{to'g'ri} = k [N_2][O_2][NO]^2$ B) $v_{to'g'ri} = k [N_2][O_2]$
C) $v_{to'g'ri} = k [NO]^2$ D) $v_{to'g'ri} = k [N_2][NO]^2$

10. 0.1 g natriy gidroksid saqllovchi 1 dm³ eritmaning vodorod ko'rsatkichini (pH) hisoblang. Ishqorni to'liq dissotsiyatsiyalanadi deb qarang.

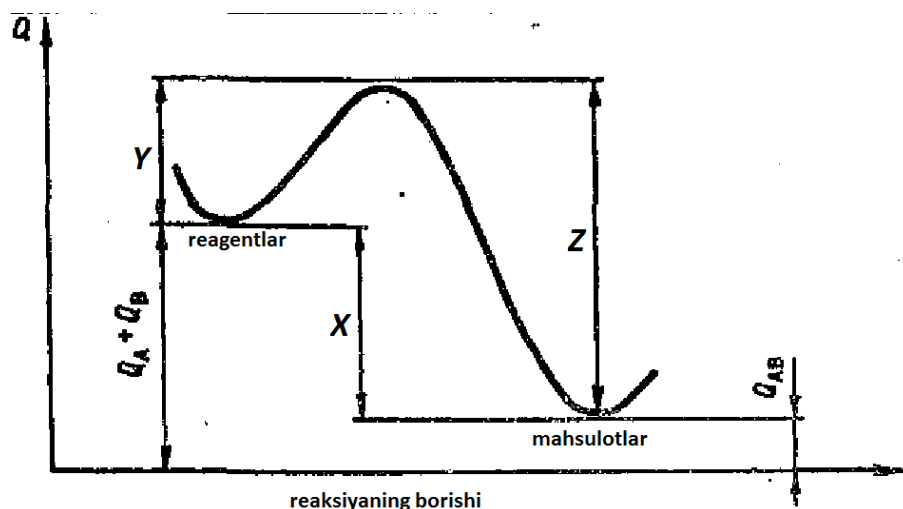
- A) 2.6 B) 3.6
C) 11.4 D) 10.4

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2-qism: Har bir topshiriq 1,5 ballardan baholanadi

11. Quyida $\{A + B = AB\}$ reaksiyaning energetik profili keltirilgan:



Diagrammadagi noma'lum harflar nimani bildiradi, mos variantlarni tanlang	Variantlar	
X	A	To'g'ri reaksiyaning aktivlanish energiyasi
Y	B	Teskari reaksiyaning aktivlanish energiyasi
Z	C	Reaksiyaning issiqlik effekti

- A) X-C, Y-A, Z-B B) X-B, Y-A, Z-C
C) X-C, Y-B, Z-A D) X-A, Y-B, Z-C

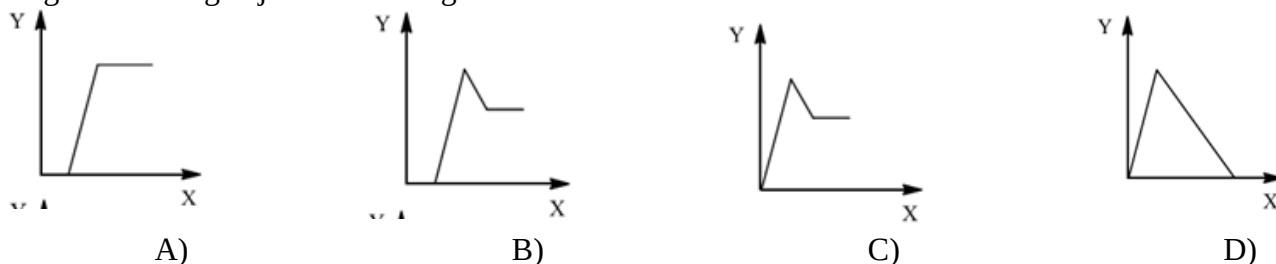
12. Quyidagi qatorda kislotalar kuchi oshib borishi ketma-ketligini ko'rsating: ClH_2CCOOH , Cl_2HCCOOH , Cl_3CCOOH

- A) $\text{ClH}_2\text{CCOOH} < \text{Cl}_2\text{HCCOOH} < \text{Cl}_3\text{CCOOH}$ B) $\text{ClH}_2\text{CCOOH} < \text{Cl}_3\text{CCOOH} < \text{Cl}_2\text{HCCOOH}$
C) $\text{Cl}_3\text{CCOOH} < \text{Cl}_2\text{HCCOOH} < \text{ClH}_2\text{CCOOH}$ D) $\text{Cl}_3\text{CCOOH} < \text{ClH}_2\text{CCOOH} < \text{Cl}_2\text{HCCOOH}$

13. Bor modeliga ko'ra vodorod atomidagi elektronning energiyasi quyidagicha aniqlanadi: $E = \frac{-13,6}{n^2}$ (eV), bu yerda $n = 1, 2, 3, \dots$ va h.k. butun sonlar. Bor modeliga ko'ra elektronni 1-orbitadan ($n = 1$) 5-orbitaga ($n = 5$) o'tkazish uchun qancha energiya (eV) talab qilinadi?

- A) 13,06 B) 10,2
C) 13,6 D) 40,8

14. NaOH eritmasi H^+ , Mg^{2+} va Al^{3+} ionlarini saqlagan rangsiz eritmaga tomchilatib qo'shildi. Hosil bo'layotgan cho'kma massasi (Y o'qda) ning sarflangan NaOH eritmasi hajmi (X o'qda) ga bog'liqligi to'g'ri ko'rsatilgan javobni tanlang.



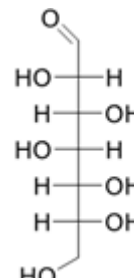
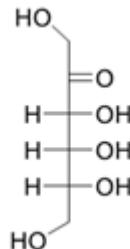
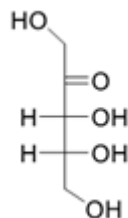
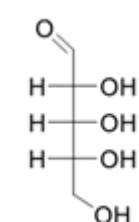
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Kimyo 11

15. $2\text{O}_3(\text{g}) \rightarrow 3\text{O}_2(\text{g})$ reaksiyasida kislorodning hosil bo'lish tezligi $3,0 \cdot 10^{-7} \text{ mol}/(\text{dm}^3 \cdot \text{s})$. Ozonning sarflanish tezligi qanday $\text{mol}/(\text{dm}^3 \cdot \text{s})$?

- A) $1,6 \cdot 10^{-10}$ B) $3,0 \cdot 10^{-7}$
C) $2,0 \cdot 10^{-7}$ D) $4,5 \cdot 10^{-7}$

16. Quyidagi birikmalardan qay biri piranoza formasida mavjud bo'la olmaydi?



- A) B) C) D)

17. DNK yarimkonservativ replikatsiyaga uchraydi, ya'ni har bir zanjir alohida ko'payadi va yangi DNK molekulasiga aylanadi. Yangi zanjirlarni ^{14}N yoki ^{15}N saqllovchi substartlar ishtirokida hosil qilish mumkin. Tajribada bir zanjiri faqat ^{14}N , ikkinchi zanjiri esa faqat ^{15}N tutuvchi DNK(gibrid DNK) ishlatildi. Gibrid DNK ^{14}N saqllovchi substrat ishtirokida replikatsiya qilindi. Agarda tajriba boshida bitta gibrid DNK molekulasi bo'lgan bo'lsa, 4 ta replikatsiya siklidan so'ng ^{15}N tutadigan ikkizanjirli molekulaning ulushini toping.

- A) $\frac{1}{4}$ B) $\frac{1}{8}$
C) $\frac{1}{16}$ D) $\frac{1}{32}$

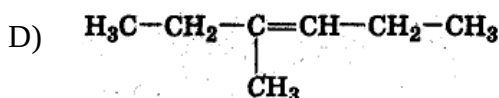
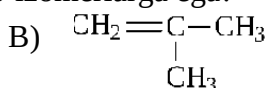
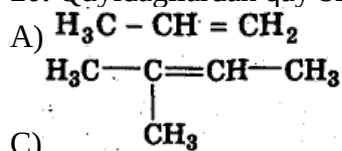
18. Berilgan tartibda elemntlarning oxirgi elektroni uchun orbital kvant sonining qiymati qanday o'zgaradi (elementning tartib raqamlari berilgan)? $11 \rightarrow 17 \rightarrow 3 \rightarrow 18$ a) ortadi b) kamayadi c) o'zgarmaydi

- A) 1-a, 2-b, 3-a. B) 1-b, 2-b, 3-a.
C) 1-a, 2-b, 3-b. D) 1-a, 2-b, 3-c.

19. Ma'lum reaksiyaning temperatura koeffisienti 2.5 ga teng. Shu reaksiya temperaturasi 20°C dan 45°C gacha oshirilganda reaksiya tezligi qanday o'zgaradi?

- A) 2.5 marta oshadi B) 9.88 marta oshadi
C) 61.76 marta oshadi D) 2.5 marta kamayadi

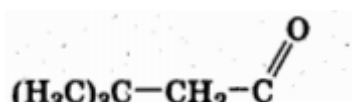
20. Quyidagilardan qay biri sis-trans-izomerlarga ega?



3-qism: Har bir topshiriq 2,6 balldan baholanadi

21. Arxeologlar yog'ochdan ishlangan jihoz na'munasini aniqlashdi. Undagi uglerod-14 izotopining miqdori hozirgi vaqtda Yerda o'suvchi daraxtlardagiga nisbatan 75 % ni tashkil etdi. Aniqlangan jihozning yoshini aniqlang. $t_{1/2} (^{14}\text{C}) = 5730$ yil.

22. Quyidagi tuzni ishqor bilan qizdirilganda hosil bo'lgan uglevodorodni nomlang:



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23. Bor modeliga ko'ra vodorod atomidagi elektronning energiyasi quyidagicha aniqlanadi: $E = \frac{-13,6}{n^2}$ (eV), bu yerda $n = 1, 2, 3, \dots$ va h.k. butun sonlar. Bor modeliga ko'ra elektronni 1-orbitadan ($n = 1$) ∞ (cheksizinchi)-orbitaga ($n = \infty$) o'tkazish uchun qancha energiya (eV) talab qilinadi?

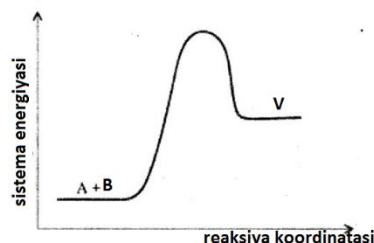
24. Propandagi barcha kovalent bog'larni uzish uchun 4006 kJ/mol energiya kerak bo'ladi, n-pentandagi barcha kovalent bog'larni uzish uchun esa 6356 kJ/mol energiya kerak. C-C bog' o'rtacha energiyasini aniqlang, kJ/mol da.

25. Fosfat kislota quyidagi dissotsiyanish konstantalariga ega:

$$pK_{1a} = 2.12 \quad pK_{2a} = 7.21 \quad pK_{3a} = 12.32$$

Digidrofasfat ioni uchun asoslik konstantasini hisoblang.

26. Agar $A + B \rightarrow V$ reaksiyaning energetik diagrammasi o'ng tomondagi sur'atda ifodalangan bo'lsa, uning ekzotermik yoki endotermik ekanligini aniqlang.



27. 20 g noma'lum metall xlorid kislota eritmasi bilan ta'sirlashganida 6.85 litr (n.sh.da) vodorod ajralib chiqqan bo'lsa, noma'lum metallni aniqlang.

28. $xS_2O_3^{2-} + yI_2 \rightarrow zS_4O_6^{2-} + 2I^-$ yarim-reaksiyadagi x,y,z koeffisientlarni aniqlang. (Javob faqat barcha koeffisientlar to'g'ri bo'lsagina inobatga olinadi)

29. ${}_{91}^{231}\text{Pa} \rightarrow {}_{82}^{207}\text{Pb} + x{}_{2}^4\alpha + y{}_{-1}^0\beta$. Protaktiniy izotopi parchalanganda 41.6 mg qo'rg'oshin va $6.02 \cdot 10^{20}$ dona elektron hosil bo'ldi. Protaktiniy izotopidagi neytronlar sonini toping (Pa neytronlari soni Pb nikidan 19 taga ko'p).

30. Gaz fazasida kechadigan $X_2 + 2Y_2 \rightarrow 2XY_2$ reaksiyaning tezligi bosim 6 marta oshirilganda qanday o'zgaradi?