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

1. Birinchi marta sun'iy yadro reaksiyasi Rezerford tomonidan 1915-yilda α-zarrachalarni azot orqali o'tkazib, kislorod-17 izotopini hosil qilish orqali bajarilgan. Bu jarayonda yana qaysi element yadrosi hosil bo'lgan?

A) vodorod B) geliy C) litiy D) berelliy

2. Manganat ionidagi marganetsning elektron konfiguratsiyasini aniqlang.

A) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$ B) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^0$

C) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^0 3d^1$ D) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^0 3d^0$

3. Qaysi agregat holatda har qanday modda elektr tokini o'tkazadi?

A) qattiq B) suyuq C) gaz D) plazma

4. 15% va 60% eritmalardan foydalanib 30 gramm 45% eritma tayyorlash uchun necha gramm 15% eritma kerak bo'ladi?

A) 10 B) 15 C) 20 D) 25

5. 125 g 12% kumush nitrati eritmasiga 150 g 4% osh tuzi eritmasi solinsa, necha gramm cho'kma hosil bo'ladi?

A) 14,72 B) 12,66 C) 2,09 D) cho'kma hosil bo'lmaydi

6. Standart sharoitda oq fosforning yonish entalpiyasi -760,1 kJ/mol, qora fosforniki esa -722,1 kJ/mol bo'lsa, qora fosforning oq fosforga aylanish entalpiyasini (kJ/mol) hisoblang.

A) -1482,2 B) 1482,2 C) -38,0 D) 38,0

7. Agar $Cl_2 + 3F_2 = 2ClF_3$ reaksiyada F_2 ning sarflanish tezligi 0,18 M/s bo'lsa, xuddi shu onda ClF_3 ning hosil bo'lish tezligi (M/s) qanday bo'ladi?

A) 0,18 B) 0,12 C) 0,09 D) 0,03

8. Natriy fosfovolfromat ($Na_3PW_{12}O_{40}$) tarkibidagi volframning o'rtacha oksidlanish darajasi qanday?

A) +6,00 B) +6,17 C) +6,42 D) +6,67

9. $(H_3C)_2C{=}CH_2 + DBr \rightarrow \ldots$ reaksiyada hosil bo'ladigan mahsulotni aniqlang.

A) $(H_3C)_2CBr\text{-}CH_3$ B) $(H_3C)_2CBr\text{-}CH_2D$

C) $(H_3C)_2CH\text{-}CH_2Br$ D) $(H_3C)_2CD\text{-}CH_2Br$

10. Quyida keltirilgan alkinlardan qaysi biri $NaNH_2$ ning ammiakli eritmasi bilan reaksiyaga kirishadi?

A) 2,5-dimetiloktin-3 B) 4-metilgeksin-1 C) 4-metilpentin-2 D) Butin-2

2-qism. Har bir topshiriq 1,5 balldan baholanadi

11. 1 Kyuri 1,0 gramm radiy-226 izotopining radioaktivlik darajasini bildirsa, har sekundda ushbu na'munaning nechta yadosi radioaktiv parchalanishga uchraydi? $\lambda(^{226}Ra) = 1{,}39\cdot10^{-11}$ sekund^{-1}.

A) $2{,}66\cdot10^{21}$ B) $1{,}33\cdot10^{21}$ C) $7{,}19\cdot10^{10}$ D) $3{,}70\cdot10^{10}$

12. Asosiy holatdagi vodorod atomining ionlanish energiyasini (eV) hisoblang. Vodorod atomidagi elektronning energiyasi quyidagicha aniqlanadi: $E = \frac{-13,6}{n^2}$ (eV), bu yerda n – 1,2,3, … va h.k. butun sonlar.

A) 20,4 B) 13,6 C) 12,1 D) 10,2

13. Ammiak va karbonat angidridan iborat 6,0 litr (n.sh.da) gazlar aralashmasi 9,0 gramm og'irlikka ega bo'lsa, aralashmadagi karbonat angidridining hajmini (litr, n.sh.da) aniqlang.

A) 2,31 B) 3,69 C) 2,00 D) 4,00

14. 25°C va 760 mm Hg da hajmi 1000 ml bo'lgan kolbada X gaz qamalgan. Kolba ochilganida uning massasi 0,695 grammga kamaygan bo'lsa, X gazni aniqlang.

A) NH_3 B) CH_4 C) NO_2 D) CO_2

15. Tekshirilayotgan 10,0 ml na'munadagi xlorid ionlarining konsentratsiyasini aniqlash uchun unga 20,0 ml 0,0500 M $AgNO_3$ eritmasi solishdi. Hosil bo'lgan eritmani (cho'kmani ajratmay) Fe^{3+} ionlari ishtirokida 0,0500 M KSCN bilan titrlashdi. Titrlash uchun 5,50 ml titrant sarflangan bo'lsa, na'munadagi xlorid ionlarining konsentratsiyasini (M) hisoblang.

A) 0,1000 B) 0,0725 C) 0,0500 D) 0,0275

16. 10 g 90,00°C gacha qizdirilgan Y metall bo'lagi 100 g 10,00°C temperaturali suvga (c = 4,184 J/(g·gradus)) solindi. Muvozanat qaror topganida temperatura 10,85°C bo'lsa, Y metallning issiqlik sig'imini va kimyoviy formulasini aniqlang.

A) c = 0,236 J/(g·gradus) – Ag B) c = 0,385 J/(g·gradus) – Cu

C) c = 0,449 J/(g·gradus) – Fe D) c = 0,901 J/(g·gradus) – Al

17. $Cd^{2+} + 4SCN^- \leftrightarrow [Cd(SCN)_4]^{2-}$ reaksiyaning muvozanat konstantasi (K_f) $1,0 \cdot 10^3$ ga teng. Muvozanat holatida Cd^{2+}, SCN^- va $[Cd(SCN)_4]^{2-}$ ionlarining miqdorlari 0,5 moldan bo'lishi uchun eritmaning hajmi (litr) qanday bo'lishi kerak?

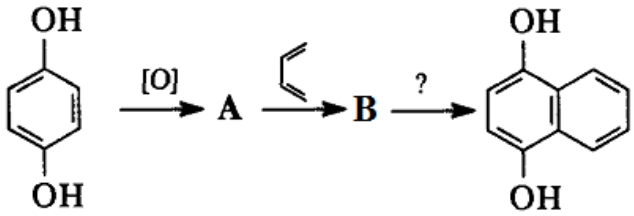
A) 2,0 B) 2,2 C) 2,8 D) 8,0

18. 2 ta mis elektrodi solingan mis(II) sulfat eritmasi 1300 sekund davomida 0,35 A tok kuchi bilan elektroliz qilinganida anodning massasi qanday o'zgaradi?

A) 0,30 grammga oshadi B) 0,15 grammga oshadi

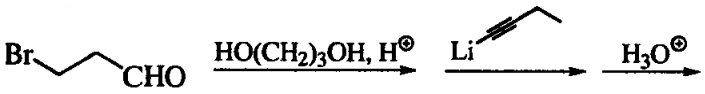
C) 0,30 grammga kamayadi D) 0,15 grammga kamayadi

19. Quyidagi sxemadagi "?" birikmaning xususiyatini aniqlang:



A) oksidlovchi B) qaytaruvchi C) dien D) dienofil

20. Quyidagi sxema yakunida hosil bo'ladigan mahsulotni nomlang:

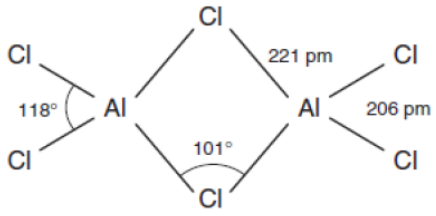


A) 1-bromgeptin-4-ol-3 B) geptin-4-diol-1,3

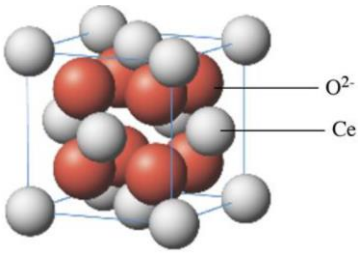
C) 1,3-digidroksigeptanon-4 D) geptin-4-al

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

21. Alyuminiy xlorid molekulasining dimeri gaz fazasida o'ng tomondagi rasmda ko'rsatilgan strukturaga ega bo'lsa, dimerdagi alyuminiy atomlari orasidagi masofani (pm) aniqlang.



22.



Chap tomondagi rasmda seriy oksidi kristallining elementar yacheykasi tasvirlangan. Ce ning oksidlanish darajasi atayin ko'rsatilmagan.

Rasmni tahlil qilib, oksidning kimyoviy formulasini aniqlang.

23. Qalqonsimon bezdan ajratib olingan 0,455 g Tiroksin gormoni 10,0 g benzolda eritildi. Hosil bo'lgan eritmaning muzlash temperaturasi 5,144°C ni tashkil etdi. Agar toza benzolning muzlash temperaturasi 5,444°C ni tashkil etsa va benzol uchun krioskopik konstanta (K) 5,12 gradus/molyal bo'lsa, Tiroksinning molyar massasini (g/mol) aniqlang. Erituvchining muzlash temperaturasi pasayishini (ΔT) aniqlash uchun: $\Delta T = -K \cdot m$, bu yerda ΔT - erituvchining muzlash temperaturasi pasayishi, K - erituvchining krioskopik konstantasi va m - eritmaning molyal konsentratsiyasi (mol/kg).

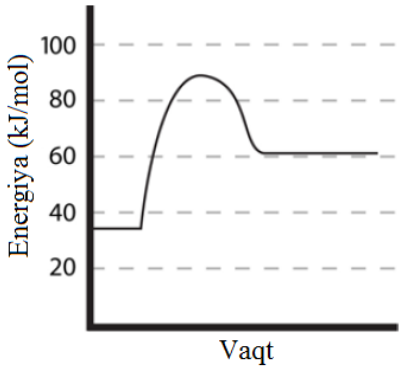
24. Quyidagi reaksiya uchun kinetik tenglama qanday? $2NO + H_2 \rightarrow N_2O + H_2O$.

$[NO]_0$, M	$[H_2]_0$, M	Reaksiyaning boshlang'ich tezligi, $M \cdot minut^{-1}$
0,60	0,37	0,18
1,20	0,37	0,72
1,20	0,74	1,44

$r = k[NO]^x[H_2]^y$ kinetik tenglamadagi x va y butun sonlarni aniqlasangiz kifoya.

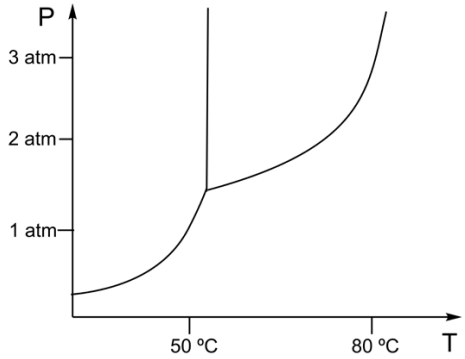
25. O'ng tomondagi rasmda A → B reaksiyaning energetik diagrammasi tasvirlangan.

Energetik diagrammani tahlil qilib, reaksiyaning entalpiya o'zgarishini (ΔH, kJ/mol) aniqlang.



26. Avtomobil xavsizlik yostiqchalaridagi 34,96 g binar birikma parchalanganida 12,35 g natriy metali va 16,0 litr hajmli yostiqchada 17°C da 1,20 atm bosim hosil qila oladigan gaz ajraladi. Xavsizlik yostiqchalarida qo'llaniluvchi binar birikmaning kimyoviy formulasini aniqlang.

27.

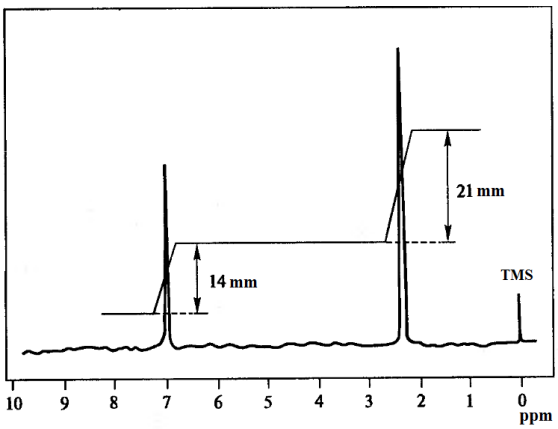


Chap tomondagi rasmda uran geksaftoridning (UF_6) fazaviy diagrammasi keltirilgan.

Fazaviy diagrammani analiz qilib, standart atmosfera bosimida qattiq holatdagi UF_6 qizdirilsa, u bilan nima bo'lishini tushuntiring (suyuqlanadi, sublimatlanadi yoki parchalanadi).

28. O'ng tomondagi rasmda C_8H_{10} tarkibli uglevodorodning ^1H YMR spektri keltirilgan.

Spektrni tahlil qiling va unga mos keluvchi C_8H_{10} tarkibli uglevodorodning struktura formulasini chizing.



29. Levulin kislotasi ($CH_3COCH_2CH_2COOH$) yuqori bosim va temperaturada Ni katalizatorligi ishtirokida gidrogenlanganda $C_5H_8O_2$ tarkibli yagona mahsulot hosil bo'ldi. Agar mahsulotning IQ-spektrida OH-guruhning yutish signali mavjud bo'lmasa, uning struktura formulasini chizing.

30. 20 xil kanonik α-aminokislotalardan foydalanib, necha xil dekapeptid (tarkibida 10 ta aminokislota qoldig'i bor oligopeptid) hosil qilish mumkin? Yon zanjirdagi funksional guruhlarning peptid bog' hosil qilishi mumkinligini inobatga olmang.