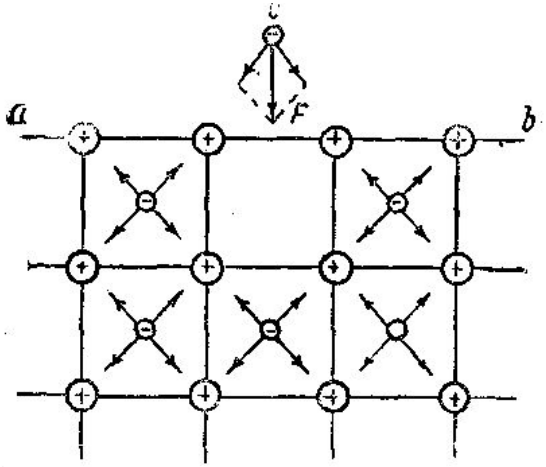
21-mavzu: Muxitlarda elektr toki.

REJA:

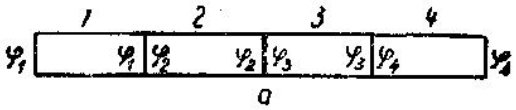
1. Metallardan elektronlarning chiqish ishi.
2. Termoelektron emissiya xodisasi.
3. Vakuumda elektr toki.
4. Gazlarda elektr toki.
5. Ionlanish va rekombinatsiyalanish jarayonlari. Gaz razryadining to‘liq voltamper xarakateristikasi. Mustaqil va mustaqil bo‘lmagan gaz razryadlari. Mustaqil gaz razryadlarining turlari va ularning qo‘llanilishi.
6. Plazma haqida tushuncha.

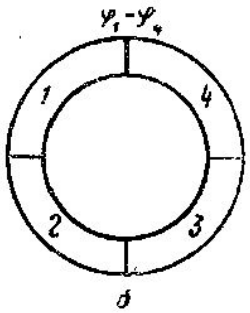
Matnazarov Anvar

1. Metallardan elektronlarning chiqish ishi.

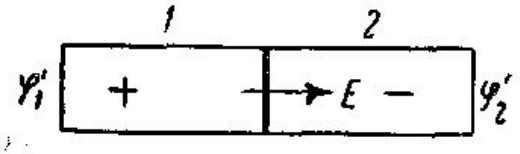


178- расм.





180- расм.



179- расм.

$$e\left(\varphi'_1-\varphi'_2\right)=A_2-A_1$$

$$\left(\varphi_1-\varphi_2\right)+\left(\varphi_2-\varphi_3\right)+\left(\varphi_3-\varphi_4\right)=\varphi_1-\varphi_4$$

$$\varphi_1-\varphi_2=-\frac{A_1-A_2}{e}+\frac{kT}{e}\ln\frac{n_{01}}{n_{02}}$$

$$\varphi''_1-\varphi''_2=\frac{kT}{e}\ln\frac{n_{01}}{n_{02}}$$

$$\varphi'_1-\varphi'_2=-\frac{A_2-A_1}{e}$$

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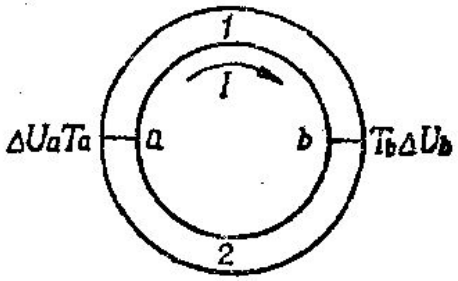
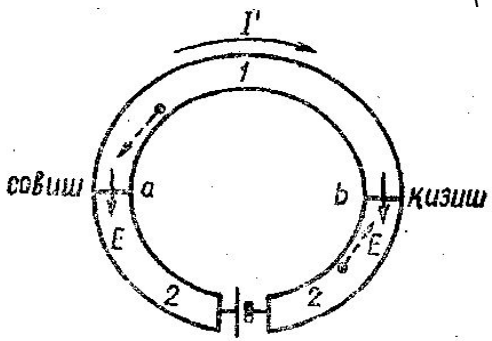
2. Termoelektron emissiya xodisasi.



181- расм.

$$E = \Delta U_a + \Delta U_b \qquad \mathsf{E} = \alpha(T_1 - T)$$

$$E = \left(-\frac{A_1 - A_2}{e} + \frac{kT_a}{e}\ln\frac{n_{01}}{n_{02}}\right) + \left(-\frac{A_2 - A_1}{e} + \frac{kT_b}{e}\ln\frac{n_{02}}{n_{01}}\right) = (T_a - T_b)\frac{k}{e}\ln\frac{n_{01}}{n_{02}}$$

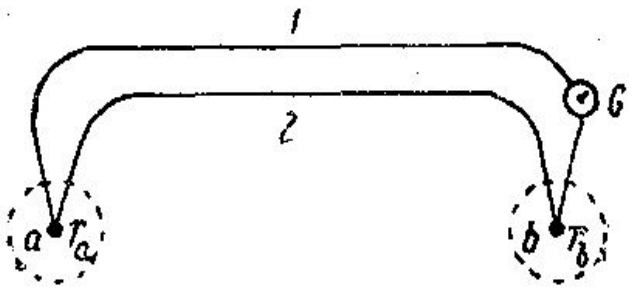


182- расм.

$$T_a = \frac{E + \alpha T_b}{\alpha}$$

$$\alpha = \frac{d\mathsf{E}}{dT}$$

$$E = \alpha(T_a - T_b)$$



183 - расм.

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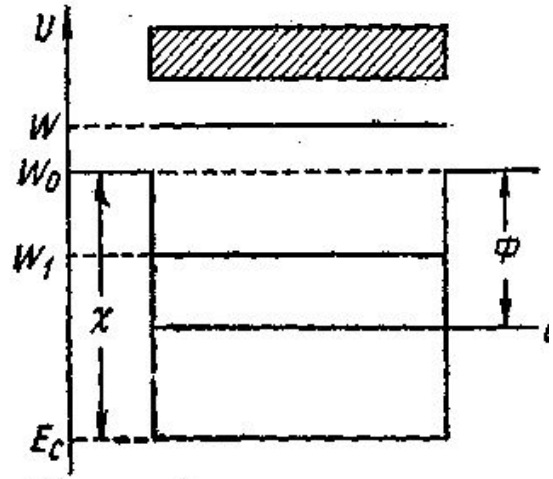
3. Vakuumda elektr toki.



270- расм. Электроннинг потенциал энергияси U нинг чекли металлда тақсимланиши:

χ — электрон яқинлик, $\varphi = W_0 - F$ — термоэлектрон чиқиш иши (158- §).

$$W \geq W_0$$

a) ***Termoelektron emissiya*** – qizdirilgan jismlardan elektronlarning chiqishi;

b) ***Fotoelektron emissiya*** yoki tashqi **fotoeffekt** – elektromagnit nurlanish ta'sirida elektronlarning chiqishi;

v) ***Ikkilamchi elektron emissiya*** – birlamchi elektronlar bilan emittirni bombardimon qilinishi natijasida ikkilamchi elektronlarning chiqishi;

g) ***Ion-elektron emissiya*** – elektroni ionlar bilan bombardimon qilanishi natijasida elektronlarning chiqishi;

d) ***Avtoelektron emissiya*** – o`tkazuvchi suyuq va qattiq jismlardan, ularning sirtidan juda kuchli elektr maydoni ta'sirida elektronlarning chiqishi. Avtoelektron emissiya – tunnel effekti deb ataladigan kvant - mexanik hodisaga misol bo`ladi.

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4. Gazlarda elektr toki.

Metallda hamma vaqt yuqori kinetik energiyaga ega bo`lgan va shuning uchun undan tashqariga chiqa oladigan biror miqdordagi erkin elektronlar bo`ladi. So`ngra bu uchib chiqqan elektronlarni yana metallga tortib olish mumkin, biroq ularning o`rniga boshqa erkin elektronlar uchib chiqadi. Metalldan uchib chiqayotgan va unga uchib kirayotgan elektronlar orasida harakatchan muvozanat qaror topadi, bunipg natijasida metall sirtida o`ziga xos *elektron buluti* hosil bo`ladi. Metallning elektron chiqarishi ***elektron emissiya*** deyiladi. Bu hodisa qisman suyuqlikning bug`lanishiga o`xshaydi.

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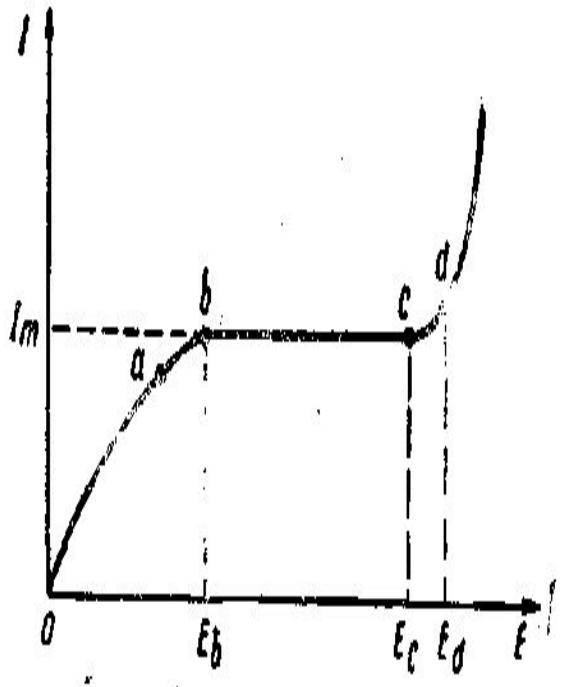
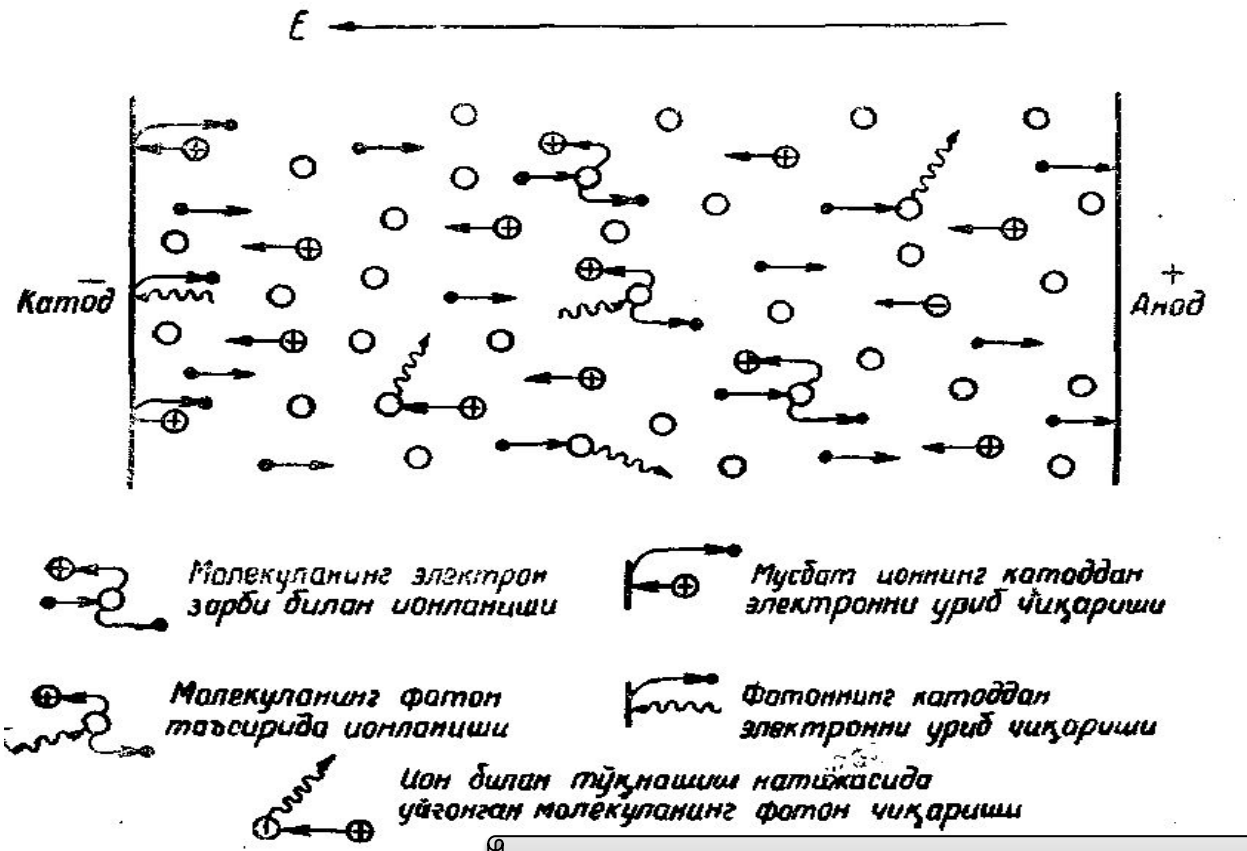
5. Ionlanish va rekombinatsiyalanish jarayonlari. Gaz razryadining to‘liq voltamper xarakateristikasi. Mustaqil va mustaqil bo‘lmagan gaz razryadlari. Mustaqil gaz razryadlarining turlari va ularning qo‘llanilishi.



209- расм.



6. Plazma haqida tushuncha.

$$\rho_+ + \rho_- = 0 \qquad \rho_+ = \mid \rho_- \mid \qquad \frac{e^2}{4\pi\varepsilon_0 < r >} = \frac{e^2 n_0^{1/3}}{4\pi\varepsilon_0} << kT$$

$$D = \sqrt{\frac{\varepsilon_0 kT}{2n_0 e^2}} \qquad \varphi_0 = \frac{q}{4\pi\varepsilon_0 r}$$

$$\varphi \approx \frac{q}{4\pi\varepsilon_0 r} e^{-r/D} \qquad N_D = \frac{4}{3}\pi D^3 n_0 >> 1$$

$$D = \sqrt{\frac{\varepsilon_0 kT_э T_u}{\left[n_0 e^2 (T_э + T_u)\right]}} = \sqrt{\frac{\varepsilon_0 kT_u}{\left[n_0 e^2 \left(1 + \frac{T_u}{T_э}\right)\right]}}$$

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