Lecture 29 iq25

1. Velocity selector
2. Hall effect: h2: 006-010
   - Experiment which determines the sign of the carrier charge.
   - Direction of Hall current
   - Calculate the Hall voltage
   - Relationship between number density and the mass density.
     - One mole has
       - the molar mass M, and
       - the total # of free electrons =(# valence electrons)N_A.
3. Sliding bar
   - Magnetic force ahd polarized charges
   - plalrization field, sign of emf.
   - Mechanical power =electric dissipative power
4. Hint on two problems in h3
   - 002
     - Magnetic force and polarized charges
     - Direction of the emf is determined by the direction of the magnetic force
   - 016 emf generated in a rotating loop

Announcement:

Learning module:

Feedback will be incorporated into the lecture.

The learning modules will count as part of the homework score: instead of homework accounting for 15%, we now have homework at 12% and leaning modules at 3%.

Feedback on homework: This feedback will be used as the basic content for discussion sessions. In order to encourage participation, we have made HW feedback part of the iq clicker credit:

- iq clicker now counts for 5%,
- while feedback counts for 2%.

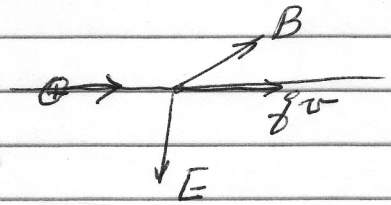
The latter is an easy 2%, as all you need to do is tell us which problem you found most confusing on a particular assignment and why. The feedback will be due on the same evening the homework is due, but the due time will be 11:50 to give those last-minute types a chance to enter feedback after completing the homework.

Words from Josh: "Please note that I will be reading the feedback, so if you enter something like "no comment" or a random string of keystrokes, you will not receive

ch25

Velocity selector —

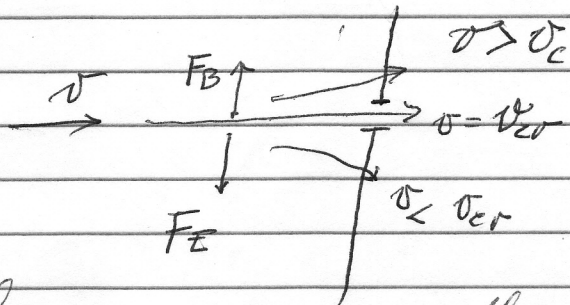
Setup



$F^B = qvB$ up

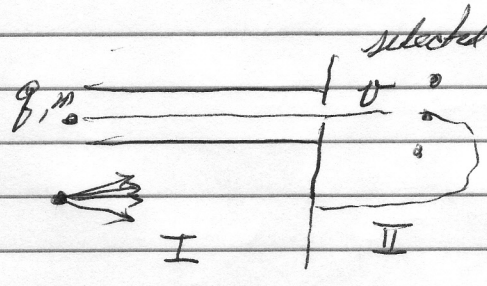
$F^E = qE$ down

Critical v: $F^B = q v_{cr} B = qE$, $v_{cr} = \frac{E}{B}$



Since E and B are given, the set up allows only $v = v_{cr} = \frac{E}{B}$ to pass thru.

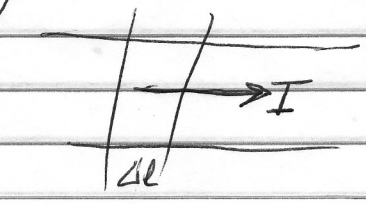
Ch 21 hw 001-003



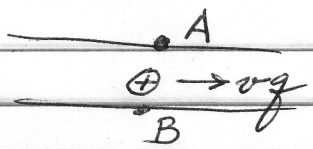
Mass spectrometer setup.

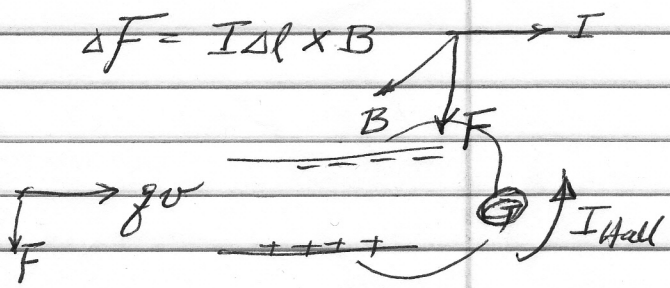
Hall effect HW Ch21-k2 Q6-Q9

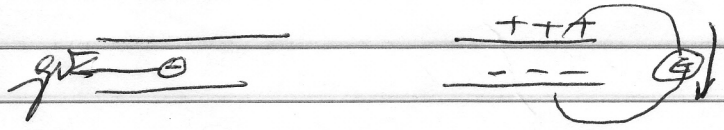
Experiment determine the sign of carrier charge



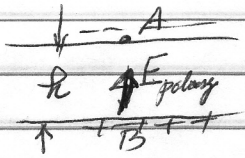
$\Delta F = I \Delta l \times B$







V_{Hall}:



Case 1 Downhill is up

Polarized charge F bring test charge from A to B.

$$EMF = \frac{W_{A\to B}}{q} = \frac{qvBh}{q} = vBh.$$

Hall voltage: $V_{Hall} = vBh$

Determine v: $I = |q| i = |q| nAv$

First determine n

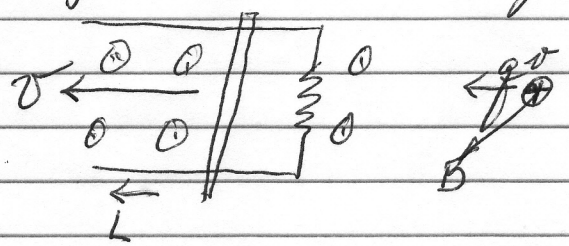
$$\frac{n}{\rho} = \frac{\#\text{ of valence electrons in 1 mole}}{\text{mass (in 1 mole)}} = \frac{2N_A}{M}$$

Example: 2 valence electrons

$$n = \frac{2N_A}{M}\rho$$

Ch21-13 006

Sliding bar along 2 ∥ conducting rails. 006



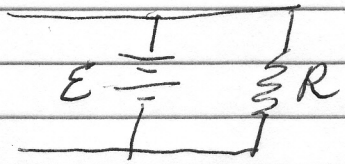
F, qv

Polarized charges

E_{pol}

Magnetic force is pushing positive test charge upward,

$$\therefore \text{emf} = \frac{W_{A\to B}}{q} = \frac{qvBh}{q} = vBh$$



Mechanical power $= Fv \stackrel{?}{=}$ Power of dissipation $= \mathcal{E}I$

$(Ih)Bv = (hBv)I$ Conservation of energy