Bio 112 Handout for Physiology 2

This handout contains:
- Today's iClicker Questions
- Handouts for today's lecture

iClicker Question #22A - before lecture

Which of the following are true?

A. Moving an ion from a low concentration to a high concentration requires energy input.
B. Moving an ion from a high concentration to a low concentration is spontaneous.
C. Ions cannot cross a membrane on their own.
D. All of the above.
E. None of the above.

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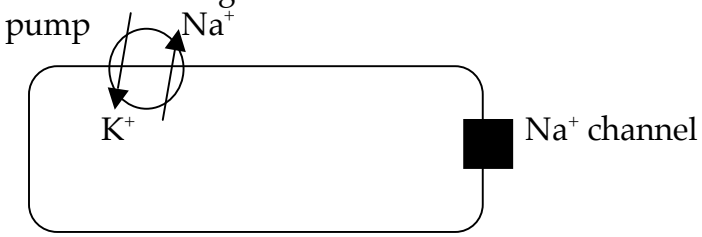
iClicker Question #22B - after lecture

Consider the following cell:



If you let the pump pump Na^+ out and K^+ in and then open the Na^+ channel, what will happen?

(A) Na^+ will go out of the cell, making V_m become +.
(B) Na^+ will go out of the cell, making V_m become –.
(C) Na^+ will go into the cell, making V_m become +.
(D) Na^+ will go intothe cell, making V_m become –.
(E) none of the above.

Beaming in your answers

1. Figure out your answer and select the appropriate letter (A-E).
2. Turn on your iCliker by pressing the "ON/OFF" button; the blue "POWER" light should come on. If the red "LOW BATTERY" light comes on, you should replace your batteries soon.
3. Transmit your answer as follows:
   a. Press the button corresponding to the answer you've selected (A thru E).
   b. The "STATUS" light will flash green to indicate that your answer has been received. If the "STATUS" light flashed red, your answer was not received; you should re-send it until you get a green "STATUS" light.

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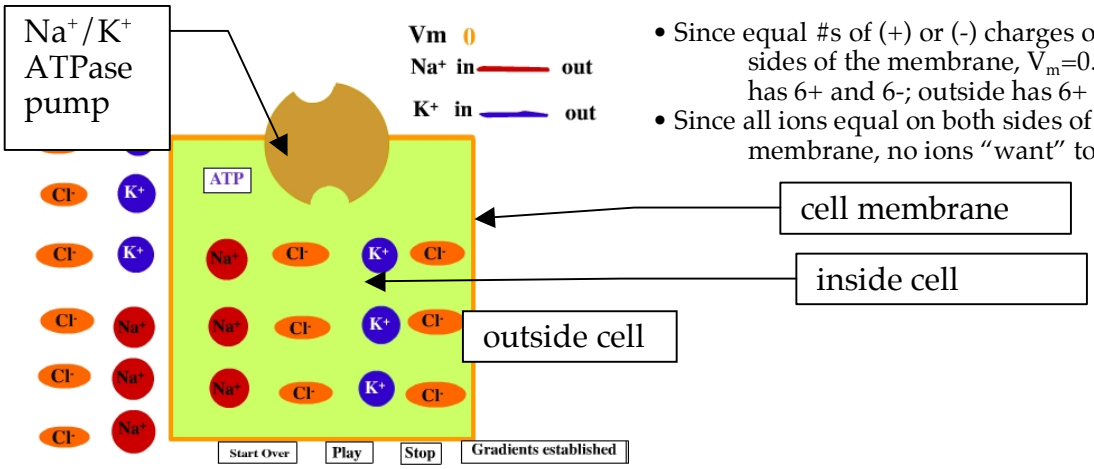
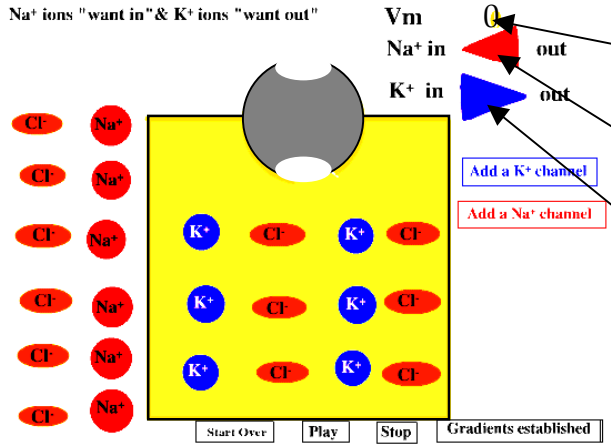
Bio 112: Resting Potential

(1) Start: all concentrations equal on both sides of the membrane. Cells are never found in this situation; it is shown only for illustration purposes.



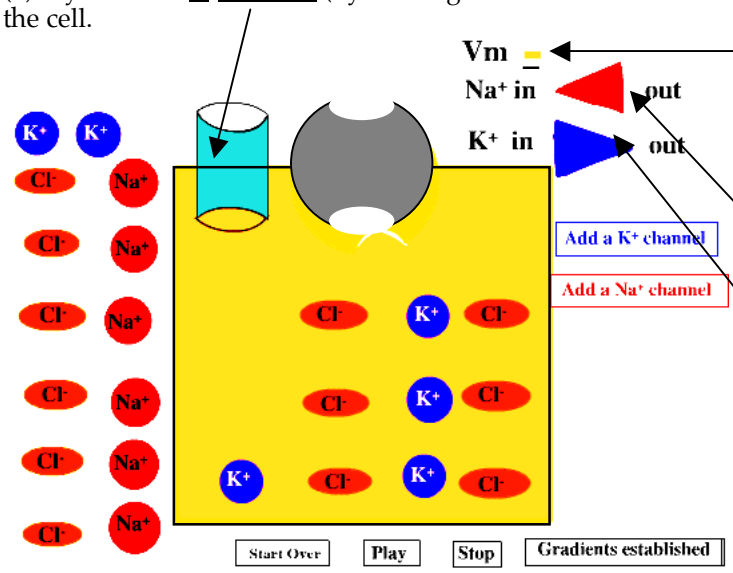
- Since equal #s of (+) or (-) charges on both sides of the membrane, V_m=0. (Inside has 6+ and 6-; outside has 6+ and 6-)
- Since all ions equal on both sides of membrane, no ions "want" to move.

(2) Na^+/K^+ ATPase pump uses energy from ATP to pump Na^+ out and K^+ in. This gives this situation (you can get here by clicking the "Gradients Established" button):



- Since equal #s of (+) or (-) charges on both sides of the membrane, V_m=0. (Inside has 6+ and 6-; outside has 6+ and 6-)
- Since more Na^+ outside than inside, the Na^+ "want to go" into the cell. This is shown by the red arrow pointing in.
- Since more K^+ inside than outside, the K^+ "want to go" out of the cell. This is shown by the blue arrow pointing out.

(3) If you add a K^+ channel (by clicking the blue button marked "Add a K^+ channel"), some of the K^+ will go out of the cell.



- Since the charges are not equal on both sides of the membrane:
  - inside: 4+ & 6- ⇒ net -2 charge
  - outside: 8+ & 6- ⇒ net +2 charge
  ⇒ V_m = -70 mV (RESTING POTENTIAL)
- Since more Na^+ outside than inside, the Na^+ "want to go" into the cell. This is shown by the red arrow pointing in.
- Since more K^+ inside than outside, the K^+ "want to go" out of the cell. This is shown by the blue arrow pointing out.

If you had added a Na^+ channel, the Na^+ would have gone in, making V_m + (try it & see)

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