

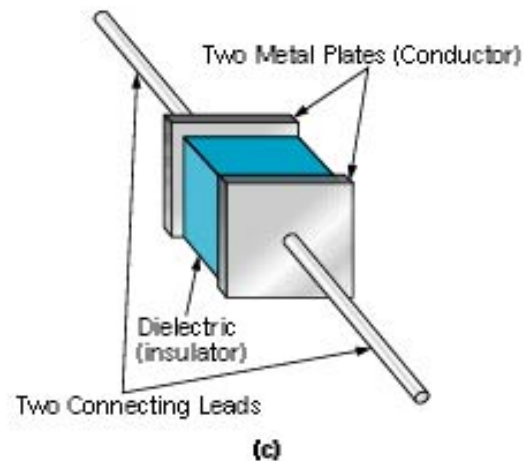
# Capacitance and Capacitor

Jee-Hwan Ryu

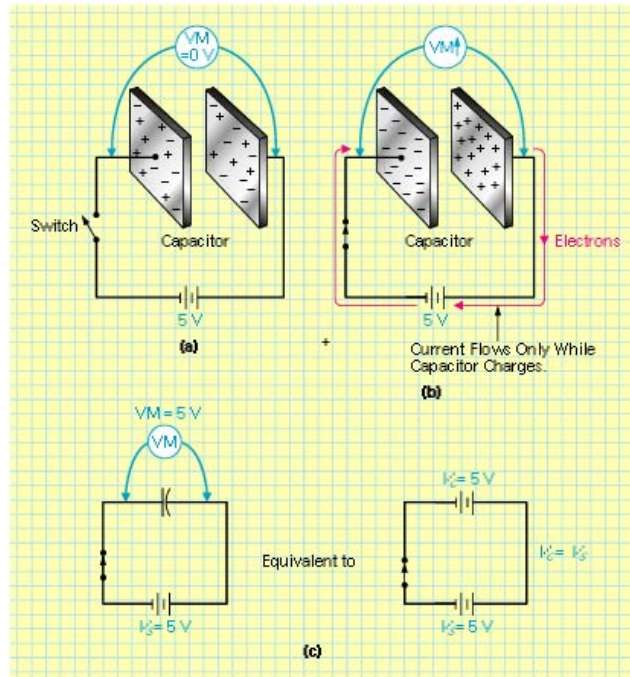
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Korea University of Technology and Education

## 커패시터 (Capacitor)

- 전기에너지를 축적하는 장치

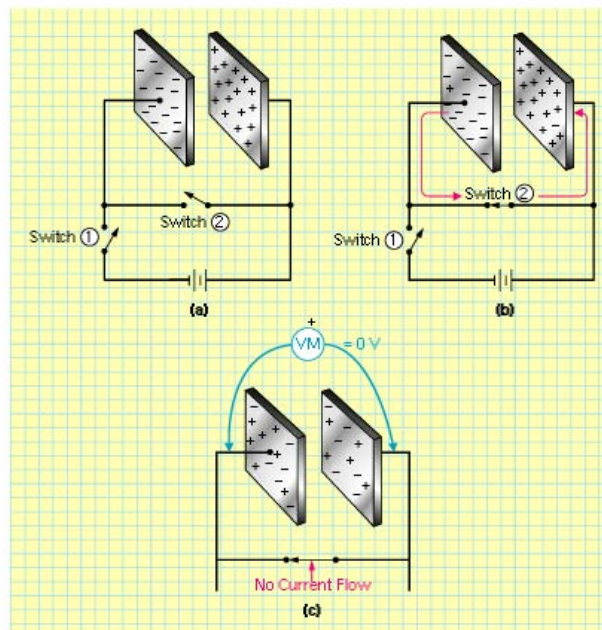


# 커패시터의 충전



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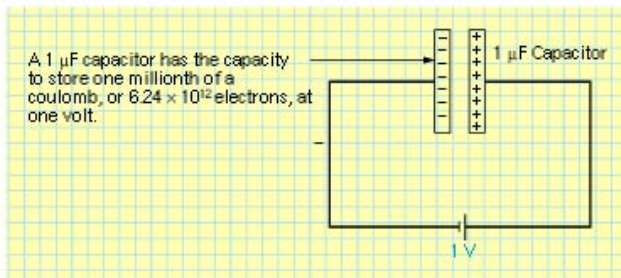
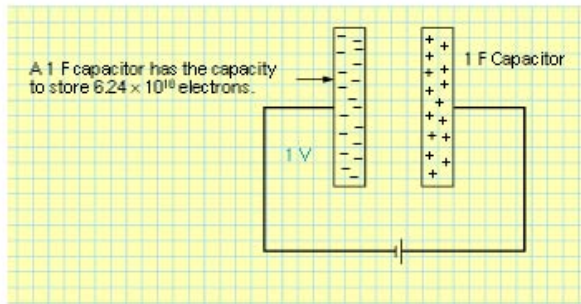
# 커패시터의 방전



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# 커패시턴스 (Capacitance)

- 커패시턴스: 커패시터가 전하를 축적할 수 있는 능력
- 단위: 패럿 (farad), Coulomb/Volt



$$C = \frac{Q}{V}$$

$$C = \frac{8.85 \times 10^{-12} \times K \times A}{d}$$

$C$  = capacitance, farad

$K$  = 유전률

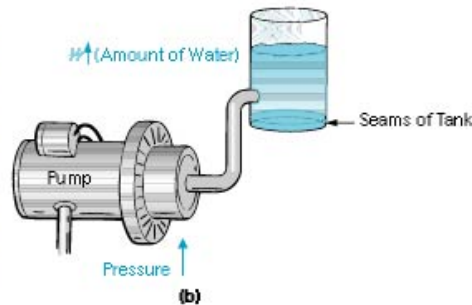
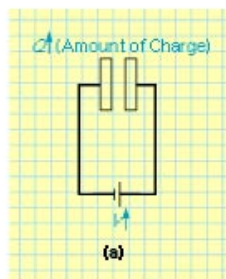
$A$  = 금속판의 면적

$d$  = 금속판간의 거리

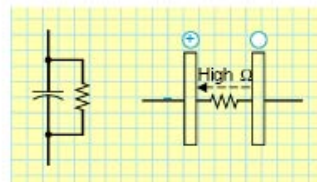
Kore

# 유전체의 절연파괴 및 누설 (leakage)

절연파괴 전압: 유전체 또는 절연체에서 절연파괴가 일어나는 전압



누설전류(Leakage Current): 절연체 또는 유전체를 통해 흐르는 원치 않는 작은 전류

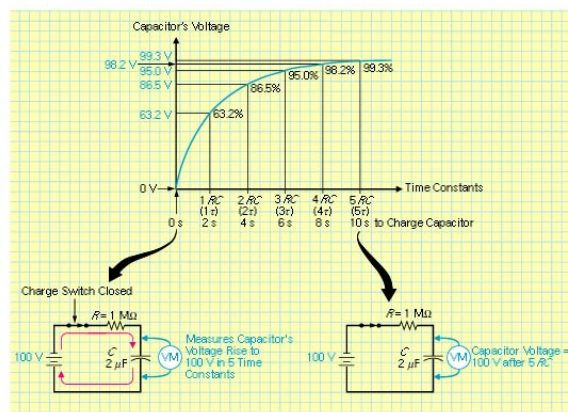
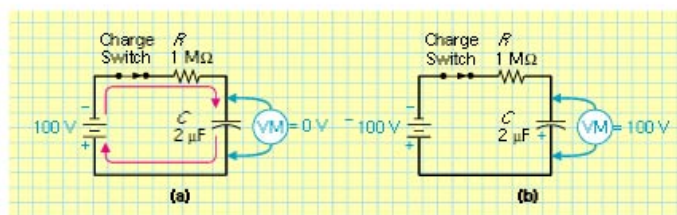


# 커패시터 값의 부호

- 주로 micro or pico 단위
  - 소수점 존재 -> micro
  - 소수점 없으면 -> pico
- 소수점 없고 3개의 숫자존재
  - 마지막 숫자 0 -> 표시된 숫자의 pico
  - 마지막 숫자 1~9 -> 승수
- 220 -> 220 pF
- 104 -> 10\*10<sup>4</sup> pF

# 커패시터 시정수-직류충전

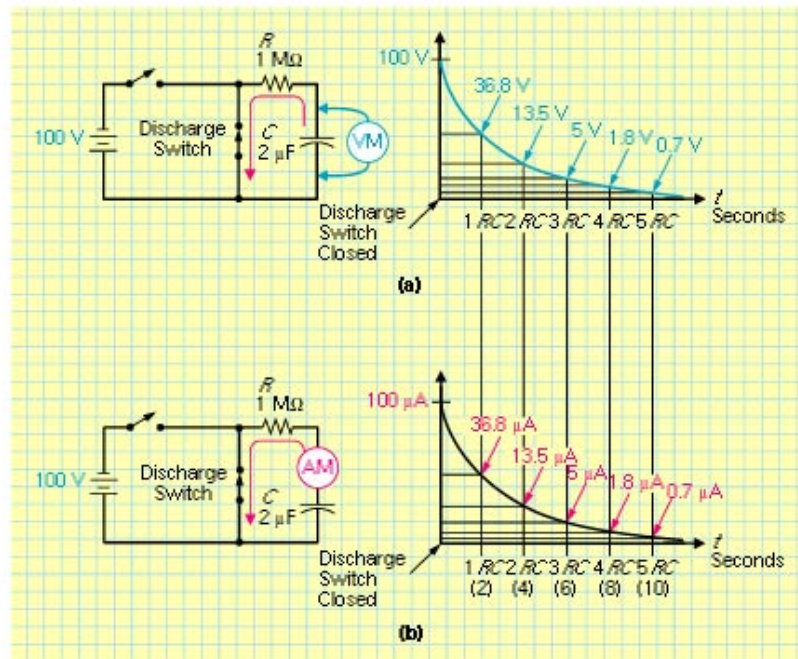
$$\tau = R \times C$$



$$i = \frac{V_s - V_c}{R}$$

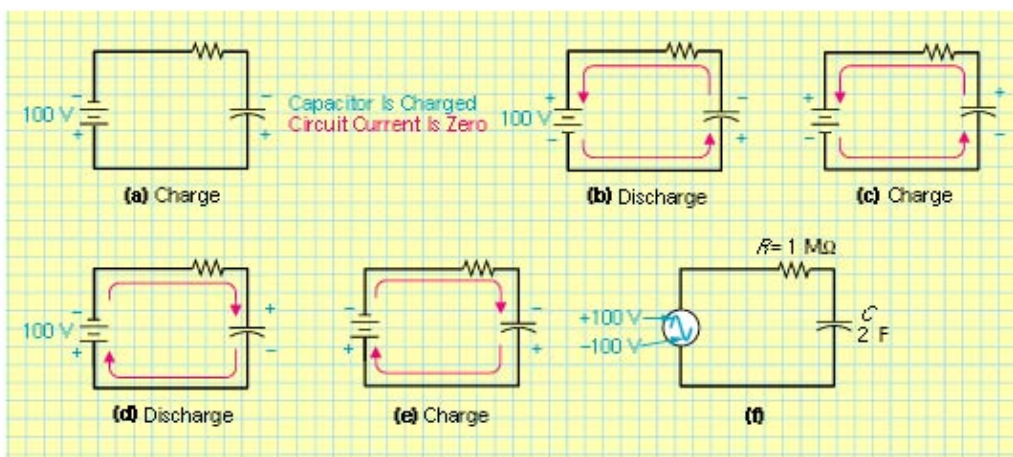
충전됨에 따라 전류감소

# 직류 방전



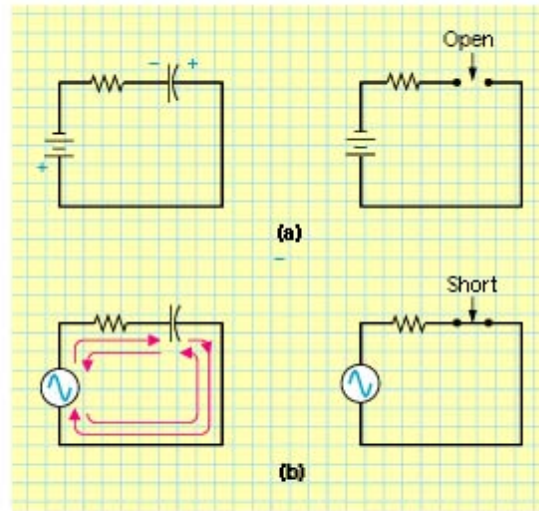
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# 교류 충전과 방전



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# 커패시터의 직, 교류 특성



Open to DC

Short to AC