

وزارة التعليم العالي والبحث العلمي
جامعة الموصل
كلية العلوم البيئية
قسم تقانات البيئة

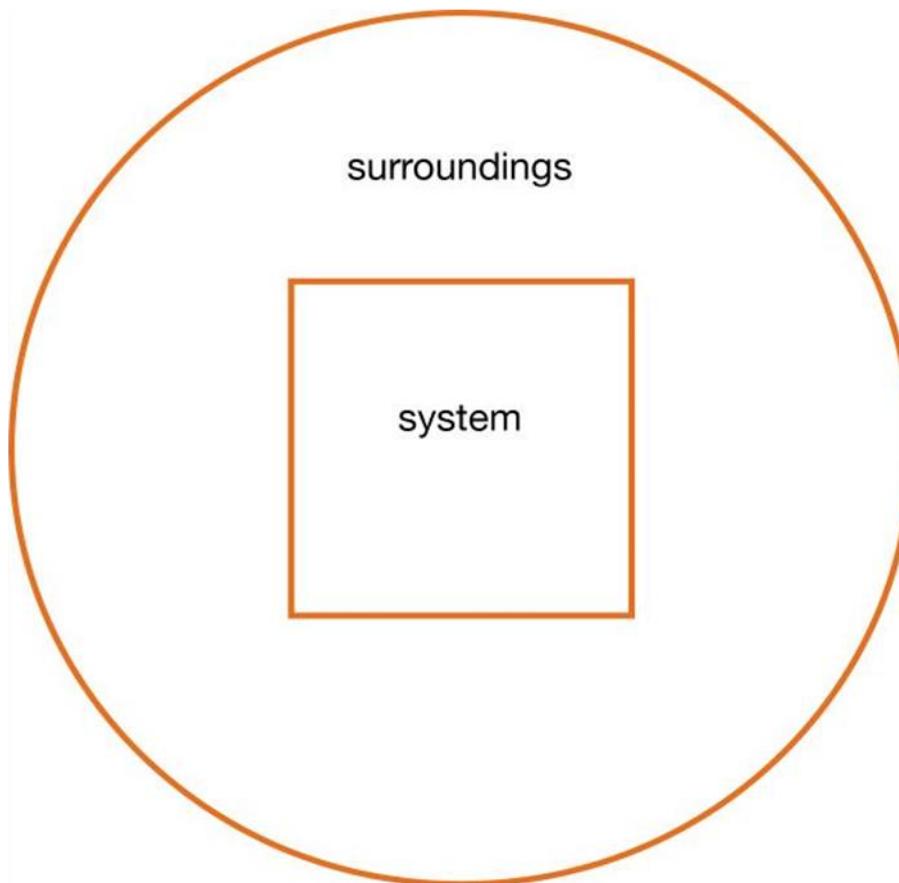
Thermodynamics

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Thermodynamic Concepts

- **Thermodynamic system:** النظام الديناميكي able to exchange heat with its surroundings
- **State variables:** p, V, T, \dots متغيرات الحالة describe the thermodynamic system
- **Thermodynamic process:** العمليات الديناميكية الحرارية changes the state (p, V, T, \dots) of the system

System and surroundings



Thermodynamic Process

Heat Q :

الحرارة

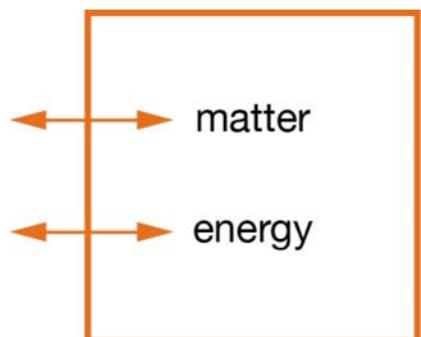
can leave or enter system

Work W :

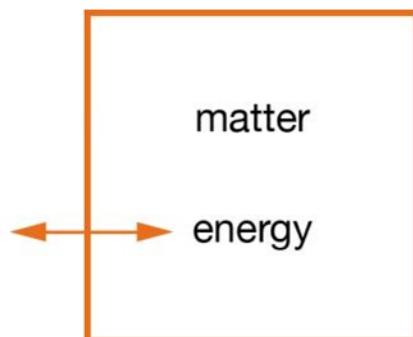
الشغل

- system can do work on its surroundings
- Surroundings can do work on the system

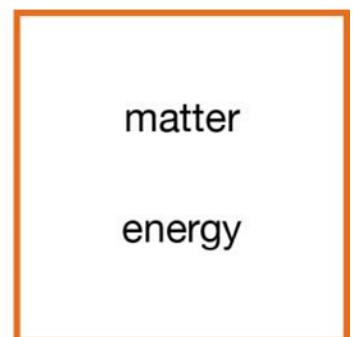
Different types of system



open system



closed system

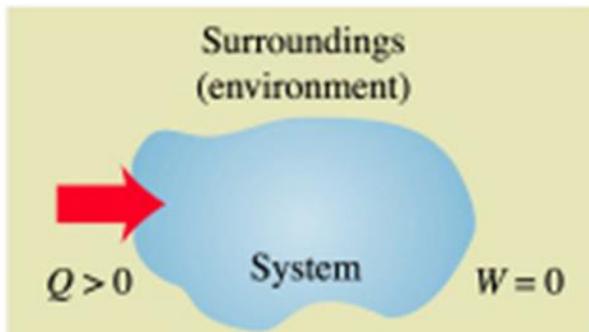


isolated system

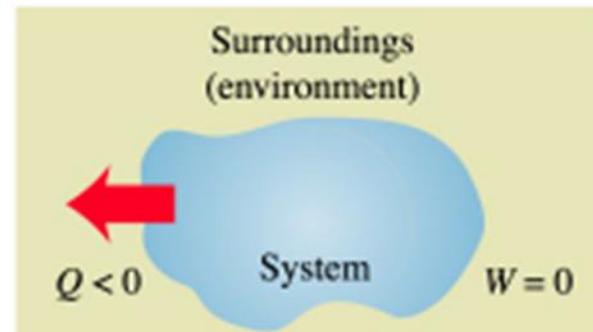
thermodynamic system:
can exchange heat with its surroundings

state of system:
 (p, V, T, \dots)

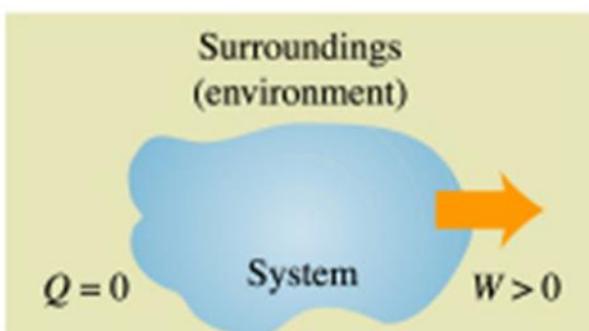
thermodynamic process:
changes state of the system



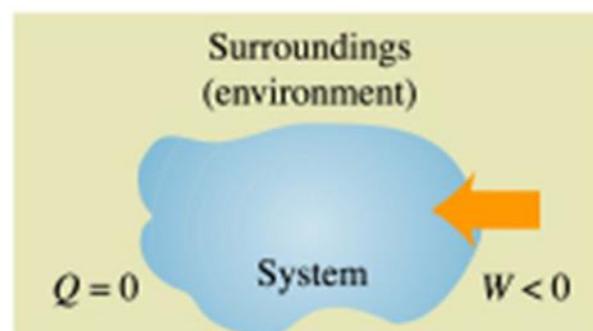
(a)



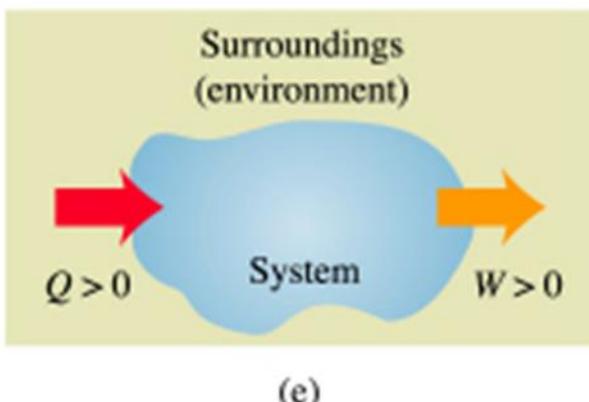
(b)



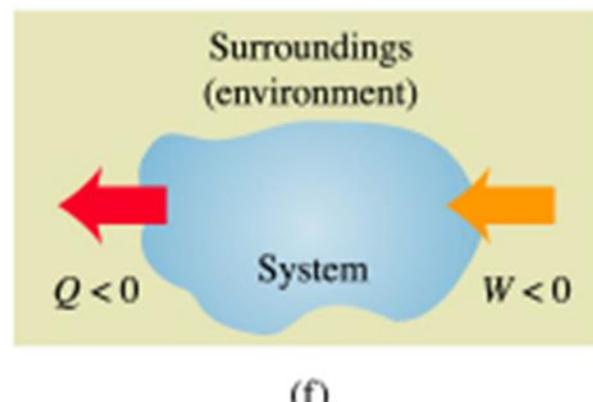
(c)



(d)



(e)



(f)

thermodynamic process:
changes state
of the system

We'll focus on
the roles of:

- Heat Q
- Work W

