英汉翻译　　练习十

1. **Regimes of heat transfer** in fluids a fluid being heated or cooled may be flowing in laminar flow, in turbulent flow, or in the transition range between laminar and turbulent flow. Also, the fluid may be flowing in forced or in natural convection. In some instances more than one flow type may occur in the same stream; for instance, in laminar flow at low velocities through large tubes, natural convection may be superimposed on forced laminar flow.

2. The properties of the fluid—viscosity, thermal conductivity, specific heat, and density—are important parameters in heat transfer. Each of these, especially viscosity, is temperature-dependent. Since a temperature field, in which the temperature varies from point to point, exists in a flowing stream undergoing heat transfer, a problem appears in the choice of temperature at which the properties should be evaluated. For small temperature differences between fluid and wall, and for fluids with week dependence of viscosity on temperature, the problem is not acute, but for highly viscous fluid such as heavy petroleum oils, or where the temperature difference between the tube wall and the fluid is large, the variations in fluid properties within the stream become large, and the difficulty of calculating the heat-transfer rate is increased.

3. Centrifugal pumps are the workhorses of the process industries. They are the most common type of pump in most process plants. Centrifugal pumps transfer the kinetic energy of rotation to the liquid, thrusting it out of the pump casing tangentially to the rotation at a higher pressure than when it entered. Centrifugal pumps have a relatively simple, compact constriction and require little maintenance compared with other pump toes. These characteristics make centrifugal pumps the economical choice for most applications. Because they do not require close clearances, as do positive-displacement pumps, they can be used with liquids containing a variety of solids and abrasive materials.

4. Heat exchangers are so important and so widely used in the process industries that their design has been highly developed. Standards devised and accepted by the TEMA are available covering in detail materials, methods of construction, technique of design, and dimensions for exchanger and cover the fundamentals of their engineering, design, and operation. Most exchangers are liquid-to-liquid, but gases and noncondensing vapors can also be treated in them.

5. The objective of evaporation is to concentrate a solution consisting of a nonvolatile solute and a volatile solvent. In the overwhelming majority of evaporations the solvent is water. Evaporation is conducted by vaporizing a portion of the solvent to produce a concentrated solution or thick liquor. Evaporation differs from drying in that the residue is a liquid—sometimes a highly viscous one—rather than a solid; it differs from distillation in that the vapor usually is a single component, and even when the vapor is a mixture, no attempt is made in the evaporation step to separate the vapor into fractions; it differs from crystallization in that emphasis is placed on concentrating a solution rather than forming and building crystals. In certain situations, e.g., in the evaporation of brine to produce common salt, the line between evaporation and crystallization is far from sharp. Evaporation sometimes produces a slurry of crystals in a saturated mother liquor.

6. Much equipment for the separation of liquids and finely divided solids was invented independently in a number of industries and is of diverse character. These developments have occurred without benefit of any but the most general theoretical considerations. Even at present, the selection of equipment for specific solid-liquid separation applications is largely a process of scale-up based on direct experimentation with the process material.

7. The nature and sizing of equipment depends on the economic values and proportions of the phases as well as certain physical properties that influence relative movements of liquids and particles. Pressure often is the main operating variable so its effect on physical properties should be known. Clarification is the removal of small contents of worthless solids from a valuable liquid. Filtration is applied to the recovery of valuable solids from slurries. Expression is the removal of relatively small contents of liquids from compressible sludges by mechanical means.