

### 2.3.4. Growth Media

Two major types of growth media are defined and complex media. *Defined media* contain specific amounts of pure chemical compounds with known chemical compositions. A medium containing glucose,  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{KH}_2\text{PO}_4$ , and  $\text{MgCl}_2$  is a defined medium. *Complex media* contain natural compounds whose chemical composition is not exactly known. A medium containing yeast extracts, peptone, molasses, or corn steep liquor is a complex medium. A complex medium usually can provide the necessary growth factors, vitamins, hormones, and trace elements, often resulting in higher cell yields, compared to the defined medium. Often, complex media are less expensive than defined media. The primary advantage of defined media is that the results are more reproducible and the operator has better control of the fermentation. Further, recovery and purification of a product is often easier and cheaper in defined media. Table 2.10 summarizes typical defined and complex media.

**TABLE 2.10** Compositions of Typical Defined and Complex Media

Defined medium		
Constituent	Purpose	Concn (g/liter)
Group A		
Glucose	C, energy	30
$\text{KH}_2\text{PO}_4$	K, P	1.5
$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	Mg, S	0.6
$\text{CaCl}_2$	Ca	0.05
$\text{Fe}_2(\text{SO}_4)_3$	Fe	$15 \times 10^{-4}$
$\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$	Zn	$6 \times 10^{-4}$
$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$	Cu	$6 \times 10^{-4}$
$\text{MnSO}_4 \cdot \text{H}_2\text{O}$	Mn	$6 \times 10^{-4}$
Group B		
$(\text{NH}_4)_2\text{HPO}_4$	N	6
$(\text{NH}_4)\text{H}_2\text{PO}_4$	N	5
Group C		
$\text{C}_6\text{H}_5\text{Na}_3\text{O}_7 \cdot 2\text{H}_2\text{O}$	Chelator	4
Group D		
$\text{Na}_2\text{HPO}_4$	Buffer	20
$\text{KH}_2\text{PO}_4$	Buffer	10
Complex medium used in a penicillin fermentation		
Glucose or molasses (by continuous feed)		10% of total
Corn steep liquor		1–5% of total
Phenylacetic acid (by continuous feed)		0.5–0.8% of total
Lard oil (or vegetable oil) antifoam by continuous addition		0.5% of total
pH to 6.5 to 7.5 by acid or alkali addition		