

THE CHEMIST'S TOOLKIT 19 Cylindrical coordinates

For systems with cylindrical symmetry it is best to work in **cylindrical coordinates** r , ϕ , and z (Sketch 19.1), with

$$x = r \cos \phi \quad y = r \sin \phi \quad (19.1)$$

and where

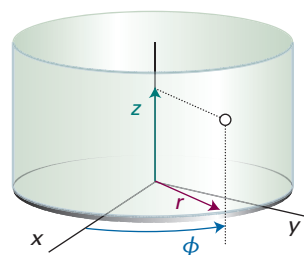
$$0 \leq r \leq \infty \quad 0 \leq \phi \leq 2\pi \quad -\infty \leq z \leq +\infty \quad (19.2)$$

The volume element is

$$d\tau = r \, dr \, d\phi \, dz \quad (19.3a)$$

For motion in a plane, $z = 0$ and the volume element is

$$d\tau = r \, dr \, d\phi \quad (19.3b)$$



Sketch 19.1