

















	of Glyc	erophos	pholi	pid
Name of glycerophospholipid	Name of X — O	Formula of X	Abbrev.	Net charge (at pH 7)
Phosphatidic acid (PA)	<u>—</u> -1	РА-н	PA	-2
Phosphatidylethanolamine	Ethanolamine	PA	PE	0
Phosphatidylcholine	Choline	PA	PC	0
Phosphatidylserine	Serine	PA NH,	PS	-1
Phosphatidylglycerol	Glycerol	РА	PG	-1
Phosphatidylinositol 4,5-bisphosphate	<i>myo-</i> Inositol 4,5- bisphosphate	РА НО ОН ОРОЗОРИ	0 ²⁻ PI	-4*
Cardiolipin	Phosphatidyl- glycerol		DPG	-2







•Sphingomyelin is abundant in myelin sheath that surrounds some nerve cells in animals.





















Lipids: Membrane Lipids

Source	Lipid Composition ^a (% of total lipids)								
	Cholesterol	PC	SM	PE	PI	PS	PG	DPG	Glycolipide
Rat Liver							-		
Plasma membrane	30	18	14	11	4	9	-	-	-
Rough endoplasmic reticulum	6	55	3	16	8	3	-	-	-
Inner mitochondrial membrane	3	45	3	25	6	1	2	18	
Nuclear membrane	10	55	3	20	7	3	-	-	
Golgi	8	40	10	15	6	4	-	-	-
Lysosomes	14	25	24	13	7	-	-	5	
Rat Brain Myelin	22	11	6	14	-	7	-	-	21
Rat Erythrocyte	24	31	9	15	2	7	-	-	3
E. coli Plasma Membrane	0	0	-	80	-	-	15	5	_

*PC = phosphatidylcholine; SM = sphingomyelin; PE = phosphatidylethanolamine; PI = phosphatidylinositol; PS = phosphatidylserine; PG = phosphatidylglycerol; DPG = diphosphatidylglycerol (cardiolipin).

Source: Adapted from M. K. Jain and R. C. Wagner. Introduction to Biological Membranes, John Wiley & Sons, New York, 1980.

*This is the mung bean and the PM contains a large fraction of phosphatidic acid (21%). From Yoshida et al. (1986) Plant Physiol 82:807



Lipids: Membranes
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Lipids: Membranes the cell from its surrounding. Fukaryotic cells have various internal membranes that divide the internal space into compartments (i.e., organelles). Membranes are complex lipid-based structures that form stable, dynamic, pliable "sheets"/barriers Membranes are composed of a variety of lipids and proteins

Lipids: Membrane Proteins

	Con	Components (% by weight)					
	Protein	Phosphlipid	Sterol	Sterol type	Other lipids		
Human myelin sheath	30	30	19	Cholesterol	Galactolipids, plasmalogens		
Mouse liver	45	27	25	Cholesterol	_		
Maize leaf	47	26	7	Sitosterol	Galactolipids		
Yeast	52	7	4	Ergosterol	Triacylglycerols, steryl esters		
Paramecium (ciliated protist)	56	40	4	Stigmasterol	_		
E. coli	75	25	0	_	_		
Note: Values do not add up to 10 example, have high glycolipid co	0% in every case to ontent.	because there are con	nponents othe	er than protein, pho	spholipids, and sterol; plants, fo		
Hiał	Meml	orane Co	mposit	tion Is Organise	ne		

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Lipids: Membranes

The 4 S's Size Shape Solubility Stability











Lipids: Membranes

The 4 S's

Size Shape Solubility Stability

Lipids: Membranes Stability ne in H₂O · Synthetic vesicle membranes can be made in vitro and can contain artificially inserted proteins. · The central aqueous cavity can enclose dissolved molecules. · They are useful artificial carriers of \odot molecules (e.g., drugs). · Vesicles fuse readily with cell membranes or 0 with each other. Gel filtration · Permeable to hydrophobic molecules (lipids, e.g., steroids) and water, but not permeable Glycine trappe to large polar solutes and ions Dynamic and flexible structures O \odot 00

