**1.** C

[1]

**2.** (a) 0.13 (pH min–1) *(Allow values between 0.125 and 0.135)* 1

(b) (DIDS) reduces the rate of decrease of (extracellular) pH;  
rate of decrease reduced less than control cells / some SCL26A9  
are not inhibited; 1 max

(c) (hypothesis supported as) SCL26A9 in excess means more  
transport of ions;  
(hypothesis supported as) when inhibited there is less transport  
of ions (needed to maintain neutral pH); 2

(d) host cells increase transcription/protein synthesis to make more carriers 1

(e) pH will fall;  
SLC26A9 transports less chloride/hydrogen carbonate ions; 2

[7]

**3.** C

[1]

**4.** (a) (i) chemical messengers secreted by endocrine glands/  
specialized cells directly into the blood/body fluid (and transported to  
specific target cells); 1

(ii) steroid hormone *e.g.* testosterone / peptide/protein hormone  
*e.g.* insulin / tyrosine derivatives *e.g.* thyroxine; 1

(b)

|  |  |
| --- | --- |
| ***Gastric juice*** | ***Pancreatic juice*** |
| produced by glands in stomach wall | produced by pancreas; |
| low pH / acidic | high pH / alkaline; |
| contains hydrochloric acid | contains HCO3–; |
| pepsinogen | trypsinogen; |
| no enzymes for lipid/starch digestion | lipase/amylase; |
| contains mucus | no mucus; |
| both contain protease; | |

*Award* ***[1]*** *for each pair.* 3 max

(c) cellulose / lignin;  
cellulase not present / no enzymes for digesting lignin;  
*Accept any other reasonable substance.* 2

[7]

**5.** (a) stomach 1

(b) enzymes speed up the digestive processes;  
(chemical) break down of food/food particles/large molecules;  
make soluble products/molecules small enough to be absorbed; 2 max

(c) to (re)absorb water/vitamins(s) (*e.g.* K and B12) / temporary storage of feces 1

(d) ***N.B.*** *for each marking point, function should accompany structure*.  
shape of villus has large surface area to improve absorption / microvilli  
increase surface area to improve absorption;  
thin walls/epithelium to allow fast diffusion;  
capillaries/rich blood supply (nearby) to absorb digested food products/  
maintain concentration gradient;  
lacteal in villus to absorb fatty acids/fats (and carry them away from  
small intestine);  
protein pumps in membrane to carry on active transport / channel  
proteins in membrane to facilitate diffusion;  
large number of mitochondria provide ATP for active transport; 3 max

[7]

**6.** A

[1]